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volume 113 · no. 1 · february 2014

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Battling obesity through better understanding and local interventions

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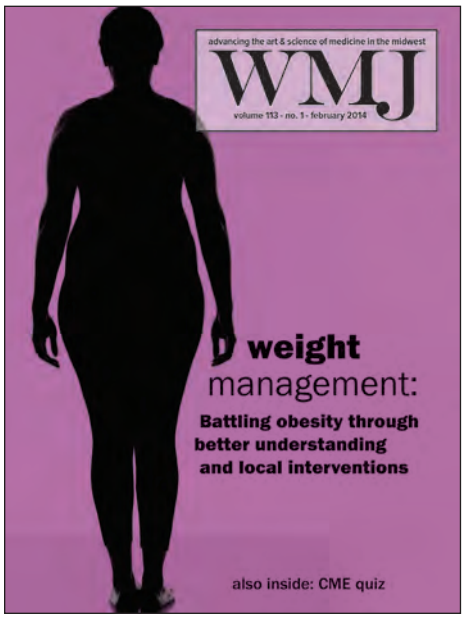
Volume 113, no. 1 • February 2014

WMJ



COVER THEME
Weight management: Battling obesity through better understanding and local interventions

Over one-third of adults in the United States are classified as obese, and its impact on public health is well documented. In this issue of *WMJ,* researchers add to that literature, exploring both the epidemiology of obesity and a potential intervention to help address the problem.

Cover design by Mary Kay Adams-Edgette.

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CASE REPORT

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SUBSCRIPTION RATES
Members: included in membership dues. Non-members: $149. Current year single copies, $25 each. Previous years' single copies, when available, $12 each.

Periodical postage paid in Madison, Wis, and additional mailing offices.

Published every other month, beginning in February. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917. Authorized August 7, 1918.

Address all correspondence to *WMJ*, PO Box 1109, Madison, WI 53701. Street address: 330 E Lakeside St, Madison, WI 53715; e-mail: wmj@wismed.org

POSTMASTER
Send address changes to: *WMJ,* PO Box 1109, Madison, WI 53701

ISSN 1098-1861
Established 1903

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Good Speech

M.G. Gillespie, MD

Editor's note: The following is an excerpt from the address of the retiring president of the St Louis County, Minnesota Medical Society, presented at a meeting of that society in Duluth, Minnesota on December 8, 1938 and published in WMJ, *Volume 38, p. 52, January 1939.*

The physician traditionally has always been held in high esteem by the people of his community, superseded only in esteem by the clergy. Whether we rightfully should receive this high regard is another matter. Nevertheless, it is true that people look up to the physician. This pedestal which we occupy casts a responsibility upon us. True enough, at present there seems to be a definite move under foot to discredit the medical profession and to break the old bond which has held patient and physician together. Therefore, it is more than ever necessary to maintain the faith, confidence and general high regard which people have placed in us, and maintain the dignity which has characterized the profession for such a long time. One of the ways whereby we can do this is through speech and manner of speaking. Sad to say, our faults in speech are not always confined to medical jargon. Too frequently physicians fall into the easy manner of conversation of the proletariat. Routine will inhibit the acquisition of a vocabulary more than any other factor. Too many of us do the same tasks each day, meet the same people, read the same newspaper, listen to the same radio programs, see the same movies, etc. In other words, we develop common interests and express ourselves in a common language. We have the same vocabulary, use the same slang expressions, the same idioms, and unconsciously repeat the same pet words and phrases. I do not have to tell you that such faulty habits and such mannerisms of speech are not conducive to the acquisition of a large vocabulary or a forceful manner of speaking.

The common use of jargon peculiar to our profession is only too well recognized by physicians themselves. Hurter, Simmons and Fishbein, Hewitt and others, have called attention to the frequent errors in the choice of words and phrases which physicians are wont to make. There are few of us who are not guilty of these errors. How often we say **acute appendix** when we mean **acute appendicitis**, or the patient was **proctoscoped** when we mean **a proctoscopic examination of the patient was made.** We fail to realize that it may be possible to **operate** a motor car, but never a patient; that the heart may be normal but never **negative**; that **pathology** means the science of disease and it is therefore absurd to speak of **pathology in the right lung. Serology** is also a science and it is the worst type of jargon to say **positive serology**. Physicians in familiar conversation frequently speak of shots for this or that, forgetting that a shot is a missile, bullet or pellet of lead. Such examples of loose speech could be continued ad infinitum, but there is no point at this time in enumerating more.

Speech is more than the faculty of uttering articulate sounds or words to express thoughts. It implies the power of speaking. Quoting Henry James again, "The more it (speech) suggests and expresses the more we live by it, the more it promotes and enhances life. Its quality, its authenticity, its security are hence supremely important for the general multifold opportunity, for the dignity and integrity of our existence."

Speaking is an art in which the tongue can be likened unto the pen or brush, and the word-thought to the tone poem of the composer or the finished canvas of the painter. As Emerson has said, "Life is our dictionary; I learn immediately from any speaker how much he has already lived through the poverty or the splendor of his speech."

Since medicine is a dignified science we should try to speak in a dignified language. Although we cannot all hope to be masters of speech, at least we can strive to cultivate and acquire the art of speaking. Lord Chesterfield said, "Every man who can speak at all can speak elegantly and correctly if he pleases;—and indeed, I would advise those who do not speak elegantly not to speak at all, for I am sure they will get more by their silence than by their speech."

If I were to counsel young men in medicine as to how to learn to speak accurately and commandingly I could do no less than suggest: Seek a diversity of interests; cultivate friendships outside your own calling. If you are so inclined, become interested in art or music.

Develop the good habit of writing, not only upon medical subjects but also those of general interest. There is no better way to enlarge your vocabulary and to learn to express your thoughts than by writing. Speak on every occasion that presents itself, and, most important of all,—read. "*Lesen, lesen, und sehr lesen.*" Most of the paucity and inaccuracies of our vocabulary are due to the lack of the stimulus of good reading. Too many of the recent graduates in medicine are content to confine their reading to the daily newsprint and weekly medical and news journals. Sad to say, some few do even less, and thereby allow themselves to sink to a lower stratum of society, so to speak, and fall into the colloquial jargon of their neighbors and neighborhood. Too few are intrigued by the masters of good literature.

To develop a catholicity of knowledge without becoming pedantic, develop an intellectual inquisitiveness, to satisfy which you must have a good dictionary and access to a good library. Experience the stimulus gained by good reading. Set aside a part of each day and form the good habit of reading systematically not only your daily print and weekly news journal, but also representative medical journals. Take a tip from Osler and have a bedside library. Cultivate the language and thought of the great contributors to literature. In speaking heed the advice of Oliver Wendell Holmes when he said, "Speak clearly if you speak at all; carve every word before you let it fall."

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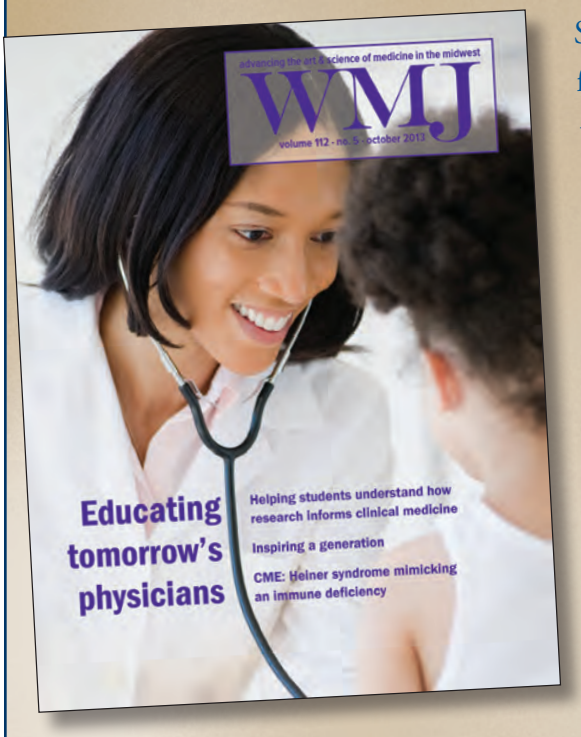

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If It Works, Test It Again

John J. Frey III, MD, Medical Editor

Young investigators often resist testing a hypothesis that has already been studied by someone else, believing that only "new" ideas have value. However, the whole basis of clinical guideline development rests on replicated studies in different populations or different settings that show similar results. Without such replication, we might still be using methods for screening or treatment that could harm patients, not improve their care. Even sports referees use instant replay to make sure they made the correct call.

The study by Pham and colleagues[1] on whether total postoperative parenteral nutrition for radical cystectomy improves patient outcomes reinforces with a large cohort study that it does not, and in fact adds both complications and cost to the care of bladder cancer patients. Their results add to the literature on this subject and should have an important effect on urologic practice. We all know that abandoning long held beliefs is hard, but it is necessary when evidence doesn't support it.

The article by Stiff and colleagues[2] on the effectiveness of applying an obesity prevention "toolkit" to a primary care practice setting is another example of repeating a study in a different population as a test of generalizability. The authors applied an evidence-based collection of training, screening, and counseling developed by an academic consortium in Vermont to a community-based practice in Appleton, Wisconsin. The question was whether it would work similarly to how it did in Vermont. The answer is "yes." The other purpose of the study was to assess whether the intervention could be implemented in a busy practice and the answer to that was "yes it can, but it costs time and effort." Implementing opportunistic screening makes great sense—do the work while the patient is in front of you. But adding time to already busy primary care practices with a payoff that will be a long time coming has to be paid for. Relative Value Unit productivity is not the way to value this type of work. But the positive reviews by both patients and clinicians about the process should have other effects on morale and motivation that make it worthwhile for everyone.

> …the whole basis of clinical guideline development rests on replicated studies in different populations or different settings that show similar results.

Zeal and colleagues[3] use targeted population data—in this case all the women who had babies in 1 Wisconsin County in a year—to examine some of the factors behind those who were obese, which has a known negative effect on maternal and fetal outcome. With the evolution of electronic health records, census data, and public health information, questions can be answered with much more sophistication and the potential for much more focused interventions. The answers they find are interesting and in some cases provocative. Neighborhoods have different rates of obesity in mothers—so neighborhoods, rather than practice-based programs, might have a greater degree of success in modifying risks. Education, at least in this county, did not have an effect on rates of obesity. But the stunning data, to me at least, was that over 70% of women who delivered babies in Dane County in 2011 had a college degree or some college education, and over 50% of babies were born to women older than 30. But further investigation showed that these trends parallel national data. The bottom line from this study is that the methods the authors use can and should be replicated in every county in the state. We need to know what is similar and what is different before we try to apply methods for modifying maternal obesity at the local level.

The case study on BALT lymphoma in an unusual location from Pathak and colleagues[4] once again reinforces the tendency for lymphomas of all types to show up where one least expects them. With the rate of non-Hodgkin lymphomas rapidly rising for the 20 years prior to the turn of the century and leveling off but still high,[5] it is good to keep such tumors in one's differential for many clinical presentations, either new findings or complications of existing diagnoses.

The case series by Pfaff and colleagues[6] from the Western part of the state on incidence of blastomycosis continues to tell the story of this ubiquitous infection. The *WMJ* has published studies from northern Wisconsin, where it is endemic,[7] and urban areas, where it is not,[8] and now from a part of the state where blastomycosis is not often suspected, but found an average of a case a year in the region.

Finally, Bakken and Kindig[9] build on their previous article on the Affordable Care Act's requirement that hospitals annually report their

contributions to their communities that raised a number of questions about how "community benefit" was interpreted.[10] Their commentary in this issue argues that the community benefit be both more transparent to the communities the hospitals serve and be directed toward tangible benefits—programs that create conditions for improving health broadly—rather than being used to make up revenue shortfalls from public insurance programs like Medicaid which, one could argue, benefit the hospitals more than the community. Their suggestion about tying the amount of benefit a community should expect to the profit margin of the hospital, particularly for nonprofit hospitals, might help bring the term "community hospital" closer to its original meaning.

REFERENCES

1. Pham KN; Schwartz IW; Garg T, et al. Immediate total parenteral nutrition after radical cystectomy and urinary diversion. *WMJ.* 2014;113(1):20-23.

2. Stiff L; Vogel L; Remington PL. Evaluating the implementation of a primary care weight management toolkit. *WMJ.* 2014;113(1):28-31.

3. Zeal C; Remington PL; Ndiaye M; Stewart K; Stattelman-Scanlan D. The epidemiology of maternal overweight in Dane County, Wisconsin. *WMJ.* 2014;113(1):24-27.

4. Pathak V; Resnick JM; Islam T. Bilateral pulmonary nodules and mediastinal lymphadenopathy in a patient with Sjogren's syndrome. *WMJ.* 2014;113(1):32-34.

5. Alexander DD, Mink PJ, Adami HO, et al. The non-Hodgkin lymphomas: a review of the epidemiologic literature. *Int J Cancer.* 2007;120 Suppl 12:1-39.

6. Pfaff BL; Agger WA; Volk TJ. Blastomycosis diagnosed in a nonhyperendemic area. *WMJ.* 2014;113(1):11-18.

7. Baumgardner DJ, Brockman K. Epidemiology of human blastomycosis in Vilas County, Wisconsin. II: 1991-1996. *WMJ.* 1998;97(5):44-47.

8. Lemke MA, Baumgardner DJ, Brummitt CF, et al. Blastomycosis in urban southeastern Wisconsin. *WMJ.* 2009;108(8):407-410.

9. Bakken E, Kindig D. Could hospital community benefit enhance community health improvement? *WMJ.* 2014;113(1):9-10.

10. Bakken E, Kindig D. Is hospital 'community benefit' charity care? *WMJ.* 2012;111(5): 215-219.

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Could Hospital Community Benefit Enhance Community Health Improvement?

Erik Bakken; David Kindig, MD, PhD

The Internal Revenue Service recently revised and standardized the reporting requirements of nonprofit hospitals as a condition of their tax-exempt status, officially known as Schedule H of IRS form 990 for nonprofit organizations. In a recent issue of this journal, we reported results from 2009, the first year that data were available.[1] In that year, Wisconsin hospitals reported $1.064 billion in community benefits, or 7.52% of total hospital expenditures. Of this amount, 9.1% was for charity care, 50% for Medicaid subsidies, 11.4% for other subsidized services, and 4.4% for Community Health Improvement Services. We noted that there was considerable variation across hospitals in both the total amount reported as well as the allocation across allowable categories, but we did not spell out the extent of this variation.[1] We believe such wide variation calls for the possibility of guidelines or standards to increase the allocations to true community health improvement investment, and we propose one such potential model for consideration.

We calculated the frequency distribution of the community benefit data reported by Wisconsin hospitals in 2009. Figure 1 displays the variation in the more than $1 billion by hospital, ranging from 0 to more than 20% of total hospital expenditures, averaging about 7.5%. Figure 2 shows the similar variation in the $47 million category of community health improvement, ranging from 0 to 1.6%. Similar variation can be seen in the other categories (additional figures available online www.wisconsinmedicalsociety.org/_WMS/publications/wmj/pdf/113/1/bakken_figs.pdf). This variation reflects the current policy reality that no standards or guidelines govern either the total amount of community benefit or its allocation across categories justifying tax-exempt status. It is our opinion that community benefit policy is too important and the needs for community health improvement resources too great to leave this decision exclusively to the individual institutions. Current efforts for joint community health needs assessment are to be commended, but only if they lead to resource allocation aligned with local population health improvement priorities.

There are 2 general potential solutions to standardize this variation. The first is to mandate the overall level of benefit required. We think one place to start is the approach first implemented in Utah[2] of having community benefit bear some relationship to the tax benefit received. In Utah, hospitals are required to have community benefit totals equal to their total state and local tax relief. The only time this was estimated for the nation was in 2006 for the 2002 year at $12.6 billion.[3] This amount needs to be updated for the nation and individual states.

> …community benefit should be more aligned to directly improving community health metrics and closing disparities, with increased resources being added to community health improvement.

Similarly, we believe that some guidance should be considered for allowable allocation across the 8 categories. Unreimbursed Medicaid was found to account for half of the total reported in Wisconsin; the amounts claimed ($536 million of the more than $1 billion total just in Wisconsin) and their range (from less than 10% to more than 80% of total community benefit reported in Wisconsin) call for deeper scrutiny.

A second category that has received little policy discussion is that of subsidized health services, defined as clinical inpatient and outpatient services provided by the hospital despite a financial loss, which would be otherwise undersupplied to the community. Examples given by IRS are substance abuse,

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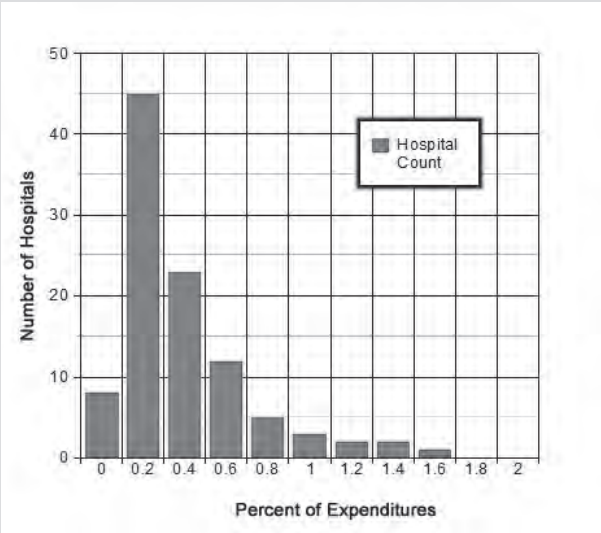
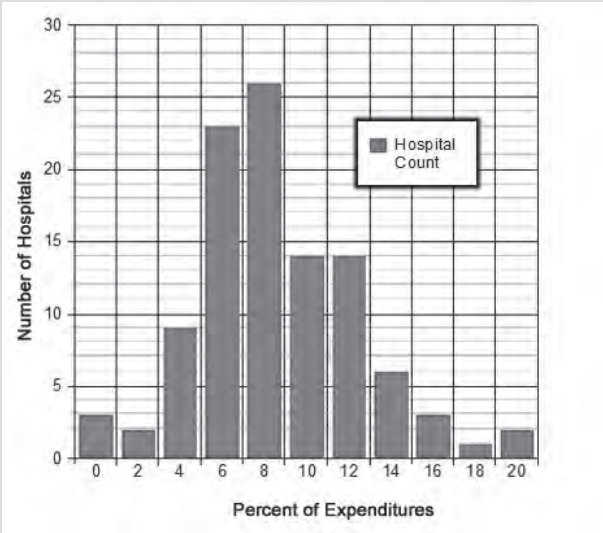
Figure 1. Total Community Health Improvement



Mean=0.4

Figure 2. Total Community Benefit



Mean=0.4

trauma centers, or mental health services.[4] While this is not as large a category as Medicaid, in Wisconsin it amounted to $121 million, or 17% of total benefit reported.

In our opinion, community benefit should be more aligned to directly improving community health metrics and closing disparities, with increased resources being added to community health improvement. As one example, we did projections that mandated that a minimum 10% of total community benefit in Wisconsin would have to be spent on the community health improvement category. We additionally increased this mandate by 2% for each 2.5% step of hospital profitability over 2.5% of revenue (ie, 2.5% profitability or below – 10% mandate; 2.6% to 5% profitability – 12% mandate; 5.1% to 7.5% profitability – 14% mandate; 7.6% to 10% profitability – 16% mandate; 10.1% to 12.5% profitability – 18% mandate; and above 12.5% profitability – 20% mandate.

This regulatory scenario would more than triple the amount of available public health dollars through community benefit provision, from $46 million to $139 million. Community health improvement would then be 13% of total community benefit, if 2009 total levels remained constant. We present this model as just an example of the type of guidance that could be imposed to achieve such a goal; certainly alternative models deserve development and critique.

This model does not project where such reallocation would come from, although we suggest that serious consideration be given initially to the Unreimbursed Medicaid and Subsidized Service categories. We do not specify how these increased revenues might be allocated. The local Community Health Improvement Plan process should be 1 guide; other priorities have been suggested by McCulloch et al in their recent Health Dividend proposal.[5]

We understand that hospitals face demanding challenges, having to produce a positive bottom line while ever improving quality and outcomes of treatment. On the other hand, we know that similar health outcomes can be obtained with lower medical care and greater nonmedical determinant investment. Community benefit dollars represent a real opportunity to improve statewide health outcomes, but under the current voluntary process are failing to meet their possible positive impact. We believe it is appropriate to have a more robust and transparent policy discussion regarding the enhanced role that standards or guidelines in community benefit obligations might bring. Several states have gone beyond federal regulation on the community benefit issue, so why not Wisconsin?

Acknowledgments: This study was supported by the Robert Wood Johnson Health and Society Scholars program at the University of Wisconsin-Madison. This program had no involvement in the design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review, or approval of the manuscript. Additional funding was provided by the La Follette School of Public Affairs through the Ina Jo Rosenberg and Shiri Eve Leah Gumbiner Fellowship. The authors have no financial or other potential conflicts of interest. E. Bakken had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

References

1. Bakken E, Kindig D. Is hospital 'community benefit' charity care? *WMJ.* 2012; 111(5): 215-219.

2. Catholic Health Association. Comparison between The Catholic Health Association and VHA Inc.'s. A Guide for Planning and Reporting Community Benefit and State Community Benefit and Related Laws, Guidelines, and Standards. September 12, 2006. http://www.nonprofithealthcare.org/resources/CHA-VHAGuideComparedToStateLaws.pdf. Accessed January 16, 2014.

3. Internal Revenue Service. 2012 Instructions for Schedule H (form 990). http://www.irs.gov/pub/irs-pdf/i990sh.pdf. 2012. Accessed December 4, 2012.

4. US Congressional Budget Office. Nonprofit Hospitals and the Tax Arbitrage. December 2006. http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/76xx/doc7696/12-06-hospitaltax.pdf. Accessed January 16, 2014.

5. McCullough JC, Zimmerman FJ, Fielding JE, Teutsch SM. A health dividend for America: the opportunity cost of excess medical expenditures. *Am J Prev Med.* 2012;43(6):650-654.

Blastomycosis Diagnosed in a Nonhyperendemic Area

Bridget L. Pfaff, MS; William A. Agger, MD, FACP, FIDSA; Thomas J. Volk, PhD

ABSTRACT

Introduction: Blastomycosis, caused by the dimorphic fungus *Blastomyces dermatitidis*, is hyperendemic in northern Wisconsin and is unevenly distributed in the rest of the state and contiguous Minnesota. Clinical presentation of this illness has been characterized by localized outbreaks and sporadic cases in endemic areas.

Methods: Using ICD-9 CPT codes, we queried our electronic health record system to identify cases of blastomycosis diagnosed at Gundersen Health System over a 32-year period. Gundersen serves a region outside the hyperendemic area of Wisconsin. Records so identified were reviewed for demographic and clinical features. We attempted to interview patients with a blastomycosis diagnosis from 2002 through 2006. Blastomycosis data also were collected from the states of Wisconsin and Minnesota from 2002 through 2006 and assessed for trends.

Results: Thirty-six patients had blastomycosis diagnoses at Gundersen Health System during the study period, as identified by ICD-9 code. Of these, 10 were excluded from further review because they were either miscoded or the code indicated a previous diagnosis. The remaining 26 patients were included in the study. Premorbid conditions included diabetes (38%) and smoking (62%). The mean time from onset of symptoms to the first laboratory specimen positive for *B dermatitidis* was 51 days. Notably, 73% of these patients were treated initially for bacterial pneumonia. The incidence of blastomycosis in Wisconsin in the review period was 2.0 per 100,000, and the rate in Minnesota was 0.5 per 100,000. Based on the census data in Gundersen Health System's 19-county service area, the incidence of blastomycosis is 0.17 cases per 100,000.

Conclusion: In this review of blastomycosis cases diagnosed outside the hyperendemic area of northern Wisconsin, diagnosis was often delayed, and 4 patients whose infections might have been treatable died. Although uncommon, blastomycosis needs to be considered in the differential diagnosis in areas outside the hyperendemic area.

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CME available. See page 19 for more information.

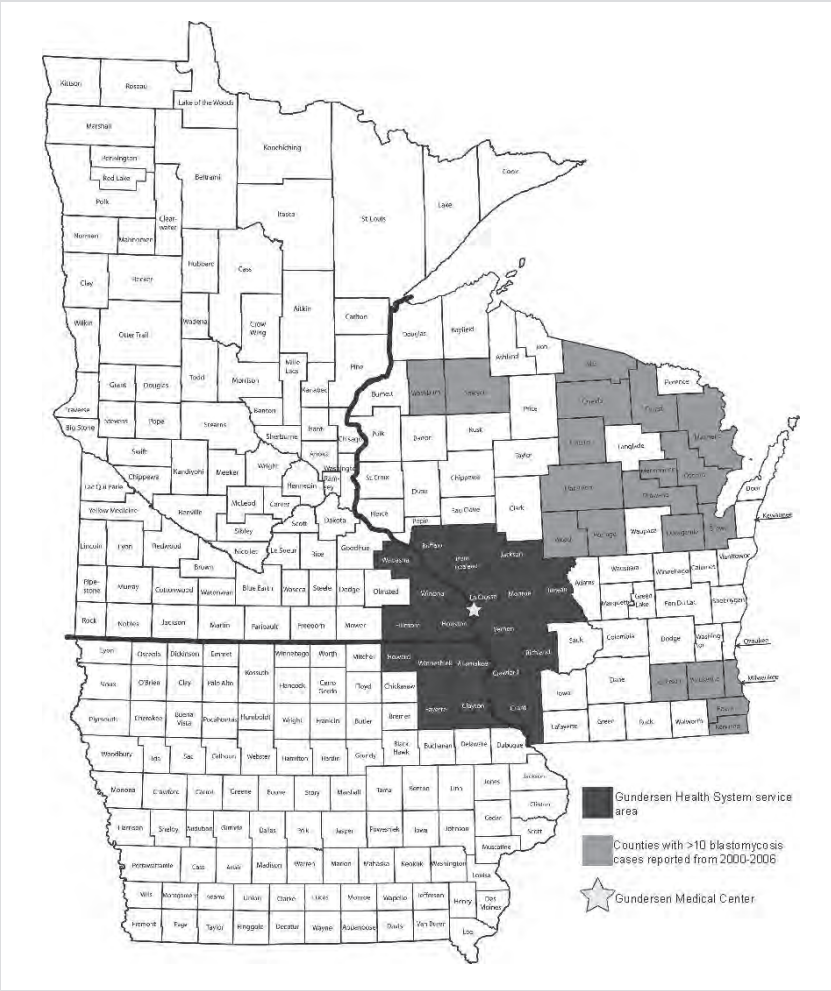
INTRODUCTION

Blastomycosis, first described from the Chicago area, is caused by the dimorphic fungus *Blastomyces dermatitidis* (mold growth at 21°C and yeast at 32°C).[1] Blastomycosis is a potentially fatal infection in humans, dogs, and other mammals.[2] The organism usually enters the host through the lungs, where it can cause an asymptomatic infection, a localized pneumonia, or severe acute respiratory distress syndrome (ARDS);[3] thereafter, it can disseminate to other tissues, such as bones, central nervous system (CNS), liver, spleen, bone marrow, genitourinary tract, and skin.[4] This fungus often is acquired along riparian environments, which in part explains its endemicity in wetter areas of the eastern woodlands of North America. In both Wisconsin and Minnesota, *B dermatitidis* has produced both localized outbreaks following point-source infections and sporadic infection.[5]

In hyperendemic counties in northern Wisconsin, health care providers maintain an index of suspicion for blastomycosis, allowing recognition in the initial pulmonary disease phase. A recent evaluation using case vignettes found that primary care providers in Wisconsin counties with a low incidence failed to include blastomycosis in their differential diagnosis, while diagnosis was more likely to be listed if the physician practiced in a higher incidence county.[6] However, even in hyperendemic counties, the diagnosis may be missed or delayed.

Since 1985, north central Wisconsin counties have reported an incidence of 10.4 to 41.9 per 100,000 persons; from 2000 through 2006, many of these counties reported more than 10 cases of blastomycosis (Figure 1).[7] It is unclear whether the increasing prevalence is due to an increase in recognition of

Figure 1. Prevalence of Blastomycosis



This map illustrates the Gundersen Health System service area and hyperendemic counties in Wisconsin with more than 10 cases of blastomycosis reported from 2000 to 2006. No county in the Gundersen service area had more than 4 cases of blastomycosis reported in the same time period.[7]

the illness, to humans entering previously undisturbed areas, or to a warmer and more humid climate.[8] Forty-four percent of Wisconsin cases were identified in residents of 10 counties in the northern part of the state that have numerous wooded waterways. This hyperendemic area has been the location of several single point-source outbreaks.[9] Over an 11-year period (November 1979-December 1990) Vilas County, a north central Wisconsin county with a population of just under 18,000, had an estimated mean annual incidence rate of 40.4 cases per 100,000 persons, with 101.3 cases per 100,000 persons in Eagle River, the county's largest town. Approximately 73% of this county is forested, and it has approximately 2300 miles of shoreline. There is an association between cases of blastomycosis and the presence of scrub and mature pine habitat in this area. This association has led to a hypothesis that after a period of measurable precipitation, a dormant natural reservoir is maintained in the acid decay of conifers. With 77% of cases presenting with pulmonary symptoms, physicians in this area appear to have a high level of suspicion for pneumonic blastomycosis and to test for it early in respiratory infections.[10]

In this retrospective blastomycosis case series, we evaluated the incidence, epidemiologic exposures, clinical features, diagnosis, and initial treatments of patients cared for in a large health system located in southwestern Wisconsin, well outside the northern Wisconsin hyperendemic area.

METHODS

A Health Insurance Portability and Accountability Act (HIPAA) waiver was approved by the Gundersen Clinic Human Subjects Committee/Institutional Review Board (IRB) prior to initiation of any research. Cases diagnosed at Gundersen Medical Center, located on the Mississippi River in southwestern Wisconsin, were identified using the ICD-9 CPT code 116; data were retrieved for cases from 1981 through 2012.

Patients who met a case definition of laboratory-confirmed blastomycosis were included in the study. Patients who reported a past history of blastomycosis were excluded from further review. In addition to epidemiologic and demographic data, clinical features, radiology, laboratory findings, and therapy were reviewed. Review of La Crosse area cases included an evaluation of the suspected exposure for each patient. We attempted to interview patients who had been diagnosed from 2002 through 2006. Because the medical records were comprehensive, interviews did not add additional information and were not conducted for the remaining cases.

Regional patient data were evaluated for clinical features. Trends identified included pneumonia diagnosis, current or former smoking, lung disease, cancer, obesity, and incidence of diabetes. We compared data from our sample (N = 26) with that of the general population of Wisconsin (N = 5,581,839) for a representative year (2005) using SAS, Version 9.3 (SAS Institute Inc., Cary, NC).[11-13] The analysis included χ^2 tests and, when each cell contained less than 20.7% of the data, Fisher exact tests. *P* value was reported from the tests to detect any significant relationship between our sample and the overall population of Wisconsin.

Although not reported on a national level, blastomycosis is reported to the Wisconsin Division of Health and the Minnesota Department of Health. Demographic data on reported cases from 2002 through 2006 were obtained from the state epidemiologists assigned to blastomycosis in both states and entered into a Microsoft Excel spreadsheet for comparison with Gundersen Health System data.

RESULTS

Demographics

Thirty-six cases were identified by ICD-9 CPT codes over 32 years from 1981 through 2012 at Gundersen Health System. All cases were reviewed, with 26 meeting our inclusion criteria. The 10 cases eliminated were either miscoded or represented a past history of inactive blastomycosis. Seventy-three percent of patients (19/26) were men, and at least 92% (24/26) were white (race information was unavailable for 2 cases). Patients had a mean age of 53.9 years (range 22-82 years), with 60% (16/26) over the age of 50 years. Age ranges are reflective of those of the general populations of Minnesota and Wisconsin. Preexisting conditions were identified in 62% (16/26) of cases. The conditions included diabetes (10/26), cancer (4/26), asthma (2/26), chronic obstructive pulmonary disease (2/26), and splenectomy (1/26).

Clinical Features

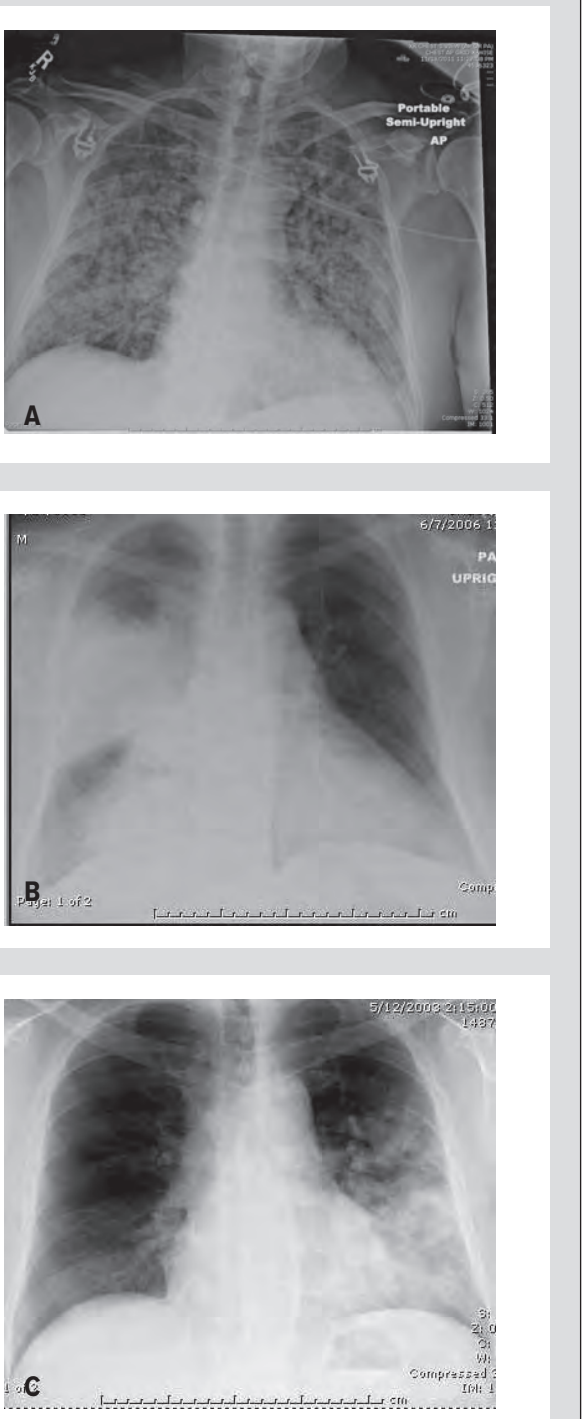
The most common symptoms were cough, chest pain, fever, chills, night sweats, and weight loss. Patients presented with an array of backgrounds at risk for lung disease: 1 patient had a long history of asbestos exposure in the workplace, and 16 (62%) were current or former smokers. Pulmonary involvement was noted in 85% (22/26). Two of the patients with pulmonary disease also had extrapulmonary symptoms. Twenty-seven percent (7/26) had extrapulmonary disease, as follows: skin (5/7), joint (2/7), bone (1/7), abdominal cavity (1/7), vertebral (1/7), and CNS (1/7).

Eighty-one percent (21/26) of patients were hospitalized for at least 1 day due to their blastomycosis. Findings from chest radiographs were highly variable—from normal, to localized infiltrate, to ARDS (Figure 2). In 73% (19/26) of cases, symptoms and signs suggestive of bacterial pneumonia were treated with various antibacterials prior to the diagnosis of blastomycosis. In the 5 patients not hospitalized, pneumonia was not considered as an initial diagnosis because the patients first were evaluated for blastomycosis skin lesions. One patient initially was given multiple courses of antibiotic treatment and underwent surgical excision due to persistent dermatitis.

Outcomes for all cases were evaluated. At the time of review, 69% of patients (18/26) were still living, 15% (4/26) had died due to blastomycosis, 8% (2/26) had died of other causes, and the outcomes for 8% (2/26) were unknown.

Time from onset of illness to the collection date for the first positive laboratory sample was available in 25 of 26 cases (mean 51 days; median 35 days; range 157 days) (Table). Infection was confirmed using KOH microscopy (5/26), culture (20/26), and histopathology, predominantly by Gomori methenamine silver (GMS) stain showing large broad-based budding yeast (12/26).

Figure 2. Sample Chest Radiographs



(A) Severe acute respiratory distress syndrome; (B) Severe pneumonia, right lung; (C) Localized pneumonia, left lung with cavitation.

Table. Southwest Wisconsin Blastomycosis: Selected Epidemiology and Clinical Features

Clinical Feature	Age/Sex	Days from Symptoms to Positive Laboratory Result	Significant Epidemiology (if Noted)	Diabetes	Smoking	Died Due to Blastomycosis	Testing Methodology
Acute Pulmonary	53/M	15	None	+	-	Yes	Bronchoalveolar lavage, culture, histopathology
	22/M	14	None	+	-	Yes	Histopathology lung tissue
	75/M	22	None	+	+	Yes	Bronchoalveolar lavage
	72/M	4	Cabin in Washburn County, Wisconsin	+	-	Yes	Sputum culture
Chronic Pulmonary	42/M	136	Cutting rotten trees	-	+	No	Sputum culture, lung biopsy, negative complement fixation
	59/F	161	Excavation of cellar 4 months prior	-	+	No	Bronchial wash, culture, histopathology, negative complement fixation, immunodiffusion positive
	66/M	69	None	+	+	No	Lung brushings, biopsy, culture, histopathology
	46/M	70	rabbit hunting	-	+	No	Bronchial wash, lung needle biopsy, culture, histopathology
	40/F	25	None	-	+	No	Bronchoalveolar lavage, culture, histopathology
	45/M	27	None	-	+	No	Bronchial brushing, lung biopsy
	52/M	n/a	Works for dredge team US Army Corps of Engineers	+	+	No	Culture
	52/M	16	Cabin in Stevens Point, Wisconsin; ill dog	-	+	No	Bronchial wash
	56/M	55	None	+	-	No	Bronchial wash, culture, DNA probe confirm, negative complement fixation
	69/M	68	Lived in Washburn County, Wisconsin	+	+	No	Bronchial wash, culture positive, positive complement fixation
	72/M	70	Clearing brush near stream	-	+	No	Lung resection, histopathology, negative complement fixation
	61/F	60	None	-	-	No	Bronchoalveolar lavage, culture
	50/F	7	Polk County, Wisconsin; canoes on Platte River	-	+	No	Lung biopsy, culture
	49/M	7	None	-	-	No	Bronchial lavage, culture
	45/F	70	None	+	+	No	Culture lung tissue
Mixed Pulmonary and Extrapulmonary	37/M	56	Northern Wisconsin travel	-	-	No	Skin biopsy, culture, negative serology
	53/F	33	None	-	+	No	Bronchoalveolar lavage
	65/F	16	None	+	-	No	skin biopsy, abdomen
Extrapulmonary	37/M	154	Vilas & Oneida County, Wisconsin; ill dog	-	-	No	Histopathology skin
	29/M	35	None	-	+	No	Skin biopsy, nose lesion, culture, histopathology
	82/M	20	None	-	+	No	Leg wound culture, histopathology, negative serology
	54/M	59	None	-	-	No	Paraspinal muscle tissue culture, histopathology

Serology using complement fixation or immunodiffusion was used to evaluate only 8 of the cases. Only 1 patient had a positive complement fixation test at 1:16, and another patient had a positive immunodiffusion test, resulting in a sensitivity for all immunologic testing of only 29%.

Treatment and Outcomes

Treatment regimens did not vary greatly and mirrored the Infectious Diseases Society of America Practice Guidelines.[14] Itraconazole was the most common treatment and was used in 58% (15/26) of cases. Amphotericin B (4/26), ketoconazole (2/26), fluconazole (3/26), and voriconazole (3/26) were the other

treatment choices. Changes in therapy were made for 5 patients. The first of these patients initially was treated with itraconazole. After no improvement and the patient developed bloody stools, a switch was made to amphotericin B, then to comfort measures only before he died due to blastomycosis. The second patient was changed to fluconazole when limited improvement was noted with itraconazole. The third patient was started on amphotericin B and then placed on ketoconazole as an outpatient. The only patient with a recurrence of infection had non-Hodgkin lymphoma. He had been treated initially with fluconazole; he relapsed with blastomycosis and was treated with voriconazole 4.1 years after the initial diagnosis. The final patient was started on voriconazole, and the regimen was changed to itraconazole due to its lower cost and better record of efficacy.

Outcomes/Misdiagnosis

Delay in diagnosis played a key role in the death of those patients who died due to blastomycosis. One case diagnosed in March 1988 was treated with various antibacterials for 2 weeks before clinical consideration of blastomycosis. Another case was diagnosed with pneumonitis in the urgent care department; the patient declined a chest radiograph at the time and was sent home with antibacterials. Within 2 days, admission to the intensive care unit was necessary; with further clinical decline, a belated sputum for KOH was obtained. Results were compatible with blastomycosis. The patient was returned to intensive care, where amphotericin was started on day 5 of the hospitalization, but the patient died that day. Another death occurred in an individual with end-stage renal disease who had an initial diagnosis of bacterial pneumonia in mid-February of 2005. This individual eventually was referred for evaluation of worsening lung nodules, and blastomycosis was not considered until day 4 of the hospitalization. On day 6 the patient developed hypoxemia and died on hospital day 16. The final death in this series occurred in an individual admitted with confusion and hyperglycemia. An infectious disease consult led to adjustment to Zosyn, doxycycline, and voriconazole on hospital day 3, but the patient went into multisystem organ failure and his prognosis was poor. He died on hospital day 6.

There was also misdiagnosis among the patients who survived their illness. In 6 patients, treatment for bacterial pneumonia was initiated before the diagnosis. Of these, 1 was placed on cefadroxil, azithromycin, and steroids for presumed pneumonia, with a diagnosis of blastomycosis delayed for 2 months. The other patients were treated with a variety of antibacterial agents. One patient whose blastomycosis initially was misdiagnosed as a bacterial infection had been ill for 6 months following a hunting trip to northern Wisconsin. The patient had a skin lesion that was treated as bacterial cellulitis, later believed to be a lipoma. The patient underwent surgical excision of the wound with histopathology before a diagnosis of subcutaneous blastomycosis was made.

Outdoor Exposure and Epidemiology

Individual cases with epidemiologic clues to the diagnosis of blastomycosis included 1 patient who reported weed whacking brush along a stream on his property. Another patient reported a musty odor when chain sawing some dead elm trees. A third patient, who had an illness onset in November, recalled excavation of a kitchen cellar the previous summer. One patient, an avid outdoorsman, recently had been rabbit hunting.

Potential occupational exposures were reported in 2 cases. The first individual owned a construction company that builds homes in the region; he also was a hunter. Another patient was a member of the dredge team for the Army Corps of Engineers.

Two patients indicated their dogs were ill just before they were diagnosed with blastomycosis. A third patient mentioned having to euthanize a dog for "lung cancer" (not histologically proven) just before being diagnosed with blastomycosis.

Twenty-four patients lived within the Gundersen Health System tristate service area. One patient lived in eastern Wisconsin. The final patient had stayed at a cabin in Washburn County, within the known hyperendemic area, just before his diagnosis. Six patients had travelled to, or lived in, the northern hyperendemic area of blastomycosis (Wisconsin counties of Vilas, Washburn, and Polk, and a cabin in northern Wisconsin).

Wisconsin and Minnesota Statewide Data

The Wisconsin and Minnesota state data include only individuals with both symptoms of blastomycosis and laboratory-confirmed infection. Demographic data collected included sex, race, and age. The rate of blastomycosis per 100,000 persons was calculated using population data for each state.[10,14] Overall in the 5-year period, Wisconsin had a higher incidence of the infection, with a rate of 2.0 per 100,000, while Minnesota had a rate of 0.5 per 100,000. The overall incidence rate of blastomycosis in combining both states was 1.3 cases per 100,000. Of note, in 2006 Wisconsin experienced an outbreak in the hyperendemic area along the upper Wisconsin River, affecting the significance of the increase in that state in 2006.[15] Based on census data in Gundersen's 19-county service area, our rate is 0.17 cases per 100,000.[16] To calculate this figure, the 26 cases in our study were combined with 5 cases reported by the only other large regional hospital (Mayo Clinic Health System Franciscan Healthcare in La Crosse, oral communication, June 2013) and a population estimation for the 19-county region was obtained. The majority of patients in the 19-county region obtain their care at 1 of the 2 hospitals.

Patients in our series were significantly more likely to have diabetes than were individuals in Wisconsin's general population (38% vs 15%, respectively; $P = .003$, Fisher exact test). They were also significantly more likely than Wisconsin's general population to be current or former smokers (62% vs 40%, respectively; $P = .024$, χ^2 test).

Patient Interviews

Five patients met the criteria for interview in 2007. Two of the 5 did not return a consent form or could not be located. During the 3 patient interviews we conducted, patients had difficulty recalling details of their illness, even though one had been diagnosed only 3 months earlier. Because the health system has a comprehensive medical record that crosses from the hospital to clinic, the patient interviews added little information and were discontinued. In the future, detailed questionnaires with targeted questions to be completed at the time of diagnosis may provide additional clues about where individuals might have been infected with the fungus. Furthermore, environmental sampling may be more productive with prompt data collection.

DISCUSSION

The blastomycosis incidence from the statewide data indicated an increase from previous reports. A rate of 0.32 and 0.72 cases per 100,000 was reported in Wisconsin between 1973 and 1982. Between the years of 1986 and 1995, a rate of 1.4 cases per 100,000 persons was reported.[7] This evaluation of Wisconsin data from 2002 through 2006 yielded a rate of 2.0 per 100,000 persons. This number was somewhat inflated by the 2006 outbreak in Lincoln County, although outbreaks also were reported during the previous data sets.[17-19] Incidence should continue to be evaluated to determine whether this increase continues, perhaps due to climatic factors, or with greater human encroachment into riparian areas of Wisconsin.

This southwestern Wisconsin regional data indicated only a slight variation from statewide trends in Minnesota and Wisconsin. Although 73% of local cases were men, men represented 65% in the combined state data. This varies from a reported trend towards a more balanced ratio of men and women (27/47 female) in cases from Vilas County, Wisconsin from 1991-1996.[20] The male predominance in this case series may be due to more occupational and vocational risk among men outside of the hyperendemic area.

The majority of southwestern regional cases were white (92%), although whites represented only 73% of cases in the statewide data. However, race data are difficult to interpret statewide due to the large number of cases with unknown race (14%). Age data also varied from the state data, with 60% being over the age of 50 years in the southwestern regional data set compared with 39% in the statewide data. No pediatric cases were identified in the regional data during the study period; there is service for pediatric intensive care at the hospital, so it is unlikely the cases were referred outside of the community. The cases are more widely distributed in all ages in the statewide data than in the regional data, perhaps due to the small sample size in the regional data set, or maybe due to the environmental foci of blastomycosis occurring in locations, unlike the Northern hyperendemic area, where children unlikely frequent.

Only 23% of our patients reported travel to the hyperendemic counties in northern Wisconsin. This could indicate the intermittent presence of the organism in the tristate area served by the Gundersen Health System, or it could indicate limited reporting by the patients. Presenting symptoms and demographic data from our cases were compared with previously published data. Eleven years of blastomycosis cases from Vilas County, Wisconsin, were reviewed. Of these cases, 77% presented with pulmonary manifestation of disease. In our series, 19 of the 26 patients had pulmonary symptoms at some time during their illness. The age range of the patients in this study was 22 to 82 years, narrower than that published in other studies of 4 months to 95 years,[9] and 6 months to 83 years,[21] a difference likely due to our much smaller sample size.

A notable association was that 62% of patients in our series were current or former smokers. This was a statistical difference that indicated being a current or former smoker is a predisposition to infection with *B dermatitidis.* This association was evaluated by Baumgardner et al in an area of high endemicity and not identified as a factor in disease.[10] Interestingly, both diabetes and smoking history have been associated with histoplasmosis and coccidioidomycosis.[22-24] The most common premorbid condition in the patients in this review was diabetes (38%). Rates of the underlying prevalence of diabetes were obtained and artificially adjusted for the study years. There was a statistical difference between the general population and patients diagnosed with blastomycosis, indicating an epidemiologic predisposition to disease in this population. White cell dysfunction due to insulin resistance may be an underlying explanation for this observation.

Not surprising was the finding that 35% of our patients reported exposure to excavation or waterways. As in other reports, activities such as clearing brush, cutting trees, or hunting were noted. Six patients in this case series reported trips to counties with a hyperendemic incidence of blastomycosis. This review extends the association with soil and waterways, as predicted by Reed et al, to the upper Mississippi River valley.[7]

If Winston Churchill had been a microbiologist, he might have described blastomycosis as "a riddle, wrapped in a mystery, inside an enigma." The *riddle* is: What is the exact niche of blastomycosis? Only rarely and transiently has this fungus been identified from nature. Therefore, limited useful data are available to warn the public of specific exposure for infection. In hyperendemic counties, such as Vilas County, Wisconsin, health care providers keep this infection high in their differential for pneumonic illnesses. In areas such as the regional health care facility studied here in southwestern Wisconsin, well outside the hyperendemic area, the illness is often far lower on the differential.[6]

The *mystery* is how to get providers to include blastomycosis in their initial differential and to test for this treatable infection. This review indicates that some trends may be worth

further investigation. An alarming 73% of patients with acute pneumonia were treated for bacterial pneumonia before therapy for blastomycosis was initiated. This supports the report of Baumgardner et al, in which providers from low-incidence counties were less likely than those from high-incidence counties to include blastomycosis in the differential when given case presentations.[6] Increasing the level of suspicion for blastomycosis could help shorten the duration from onset of illness to diagnosis of the infection. Although 13 of 26 (50%) patients in our retrospective review had prior epidemiologic features, such as activity in a riparian area, outdoor recreation, brushwork, travel to hyperendemic areas, or recent death of a pet dog due to pulmonary disease, the medical records of 8 of our cases contained no mention of an exposure factor that could have alerted providers to the diagnosis earlier. Raising suspicion for this uncommon illness may be challenging because the vast majority of cases of community-acquired pneumonia are due to more common infections.

The enigma is how to improve laboratory testing to rapidly diagnose blastomycosis with a sensitive and specific screening test. Chest radiograph results can be normal, or they can show a healed granuloma, a localized infiltrate, or a diffuse ARDS. While improved serologic testing may aid in more chronic cases or in blastomycetes epidemiology, immunologic tests based on adaptive immunity probably will remain insensitive in early, acute cases. There is a sensitive urine antigen test, though it does not differentiate histoplasmosis and blastomycosis. It is a rapid, noninvasive method that can speed diagnosis.[25] It is hoped that molecular testing to detect subclinical or mild infections due to this dimorphic fungus will aid in earlier diagnosis, as it has already led to data for epidemiologists investigating the occurrence and prevention of blastomycosis.[26]

Evaluation of regional data indicates a low level of suspicion for blastomycosis among health care providers along the Mississippi River in Wisconsin. Most patients in this review were treated for bacterial pneumonia and bacterial skin infections, sometimes for several months, before the diagnosis of blastomycosis was made. No single factor was identified that consistently could help the provider with early clues to the diagnosis. Therefore, it is imperative that health care providers consider this serious, but difficult to diagnose, fungal infection.

Newer treatment regimens did develop at the end of this period. For instance, 1 case initially treated with amphotericin followed by ketoconazole suffered a relapse, whereupon voriconazole, with its CNS penetration, proved successful. Amphotericin B remains a standby treatment for more invasive disease, although 1 patient with disseminated disease was successfully treated with intravenous followed by oral, high-dose fluconazole.[27] In non-CNS cases, itraconazole was supported as a drug of choice. These newer treatment regimens are better tolerated and allow for less expensive outpatient therapy.

CONCLUSION

In summary, the complete ecology of blastomycosis in Wisconsin remains a mystery. Until the exact niche of the fungus is identified, it will remain difficult to warn the public about how to protect themselves—and difficult for providers to consider this unusual fungal infection. For the time being, the most important key is for the medical community to promptly screen for blastomycosis in patients with a history of soil or dead vegetative exposure, with an ill dog in the home, with unusual findings on a chest radiograph, extreme acute respiratory distress syndrome, or failure to respond promptly to initial antibacterial therapy.

Acknowledgments: The authors thank Michelle A. Mathiason and Mohammed Al-Hamadani for biostatistical support; Cathy Mikkelson Fischer for editorial assistance; Mary Jo Stokes, RN, CIC Infection Prevention and Control, Mayo Clinic Health System Franciscan Healthcare for providing the number of blastomycosis cases diagnosed there; and Dr Marc Rott and Dr Diane Sewell of the University of Wisconsin-La Crosse for their help.

Funding/Support: None declared.

Financial Disclosures: None declared.

Planners/Reviewers: The planners and reviewers for this journal CME activity have no relevant financial relationships to disclose.

REFERENCES

1. Gilchrist TC. Protozoan dermatitidis. *J Cutan Gen Dis.* 1894;12:496.

2. Baumgardner DJ, Halsmer SE, Egan G. Symptoms of pulmonary blastomycosis: northern Wisconsin, United States. *Wilderness Environ Med.* 2004;15(4):250-256.

3. Meyer KC, McManus EJ, Maki DG. Overwhelming pulmonary blastomycosis associated with the adult respiratory distress syndrome. *N Engl J Med.* 1993;329(17):1231-1236.

4. Bennett JE. Introduction to mycoses. In: Mandell GL, Bennett JE, Dolin R, eds. Principles and practice of infectious diseases. Vol 2. 5th ed. Philadelphia: Churchill Livingstone; 2000:2655-2656.

5. Bradsher RW, Chapman SW, Pappas PG. Blastomycosis. *Infect Dis Clin North Am.* 2003;17(1):21-40, vii.

6. Baumgardner DJ, Temte JL, Gutowski E, et al. The differential diagnosis of pulmonary blastomycosis using case vignettes: a Wisconsin Network for Health Research (WiNHR) study. *WMJ.* 2011;110(2):68-73.

7. Reed KD, Meece JK, Archer JR, Peterson AT. Ecologic niche modeling of *Blastomyces dermatitidis* in Wisconsin. *PLoS One.* 2008;3(4):e2034.

8. Klein BS, Davis JP. A laboratory-based surveillance of human blastomycosis in Wisconsin between 1973 and 1982. *Am J Epidemiol.* 1985;122(5):897-903.

9. Centers for Disease Control and Prevention. Blastomycosis—Wisconsin, 1986-1995. *MMWR.* 1996;45(28):601-603.

10. Baumgardner DJ, Buggy BP, Mattson BJ, Burdick JS, Ludwig D. Epidemiology of blastomycosis in a region of high endemicity in north central Wisconsin. *Clin Infect Dis.* 1992;15(4):629-635.

11. Wisconsin Department of Health Services. Wisconsin interactive statistics on health—population. http://www.dhs.wisconsin.gov/wish/measures/wis_pop/long_form.html. Updated 2012. Accessed January 9, 2013.

12. Behavioral Risk Factor Surveillance System Survey Data. Prevalence and trends data, Wisconsin—2005, tobacco use. http://apps.nccd.cdc.gov/brfss/display.asp?cat=TU&yr=2005&qkey=4396&state=WI. Accessed January 9, 2014.

13. Behavioral Risk Factor Surveillance System Survey Data. Prevalence and trends data, Wisconsin—2005, diabetes. http://apps.nccd.cdc.gov/brfss/display.asp?cat=DB&yr=2005&qkey=1363&state=WI. Accessed January 9, 2014.

14. Infectious Diseases Society of America. IDSA Practice Guidelines. http://www.idsociety.org/IDSA_Practice_Guidelines/. Updated 2012. Accessed January 9, 2014.

15. Pfister JR, Archer JR, Hersil S, et al. Non-rural point source blastomycosis outbreak near a yard waste collection site. *Clin Med Res.* 2011;9(2):57-65.

16. Truven health analytics market expert. Truven Health Analytics Web site. http://truvenhealth.com/products/market_expert.aspx. Accessed January 9, 2014.

17. Cockerill FR 3rd, Roberts GD, Rosenblatt JE, Utz JP, Utz DC. Epidemic of pulmonary blastomycosis (Namekagon fever) in Wisconsin canoeists. *Chest.* 1984;86(5):688-692.

18. Klein BS, Vergeront JM, Weeks RJ, et al. Isolation of *Blastomyces dermatitidis* in soil associated with a large outbreak of blastomycosis in Wisconsin. *N Engl J Med.* 1986;314(9):529-534.

19. Klein BS, Vergeront JM, DiSalvo AF, Kaufman L, Davis JP. Two outbreaks of blastomycosis along rivers in Wisconsin. Isolation of *Blastomyces dermatitidis* from riverbank soil and evidence of its transmission along waterways. *Am Rev Respir Dis.* 1987;136(6):1333-1338.

20. Baumgardner DJ, Brockman K. Epidemiology of human blastomycosis in Vilas County, Wisconsin. II: 1991-1996. *WMJ.* 1998;97(5):44-47.

21. Morris SK, Brophy J, Richardson SE, et al. Blastomycosis in Ontario, 1994-2003. *Emerg Infect Dis.* 2006;12(2):274-279.

22. Santelli AC, Blair JE, Roust LR. Coccidioidomycosis in patients with diabetes mellitus. *Am J Med.* 2006;119(11):964-969.

23. Rosenstein NE, Emery KW, Werner SB, et al. Risk factors for severe pulmonary and disseminated coccidioidomycosis: Kern County, California, 1995-1996. *Clin Infect Dis.* 2001;32(5):708-715.

24. Kennedy CC, Limper AH. Redefining the clinical spectrum of chronic pulmonary histoplasmosis: a retrospective case series of 46 patients. *Medicine (Baltimore).* 2007;86(4):252-258.

25. Connolly P, Hage CA, Bariola JR, Bensadoun E, Rodgers M, Bradsher RW Jr, Wheat LJ. *Blastomyces dermatitidis* antigen detection by quantitative enzyme immunoassay. *Clin Vaccine Immunol.* 2012;19(1):53-56.

26. Burgess JW, Schwan WR, Volk TJ. PCR-based detection of DNA from the human pathogen *Blastomyces dermatitidis* from natural soil samples. *Med Mycol.* 2006;44(8):741-748.

27. Brick KE, Agger WA. Successful treatment of brainstem blastomycosis with fluconazole. *Clin Med Res.* 2012;10(2):72-74.

CME

To receive CME credit, complete this quiz and return it to the address listed below. See CME-designated article on pages 11-18.

Quiz: Blastomycosis Diagnosed in a Nonhyperendemic Area

EDUCATIONAL OBJECTIVES

Upon completion of this activity, participants will be able to:

1. Understand the epidemiology of blastomycosis.
2. Recognize the varied presentations of patients presenting with blastomycosis.
3. Appreciate the appropriate evaluation and treatment of patients with blastomycosis.

PUBLICATION DATE: February 14, 2014

EXPIRATION DATE: February 14, 2015

QUESTIONS

1. Which of the following statements concerning blastomycosis is false?
   - ❑ Blastomycosis is caused by the dimorphic fungus *Blastomyces dermatitidis* which is found in wet, forested areas near rivers and streams.
   - ❑ The organism usually enters the host through the lungs, where it can cause an asymptomatic infection, a localized pneumonia, or severe acute respiratory distress syndrome (ARDS); thereafter, it can disseminate to other tissues, such as bones, central nervous system, liver, spleen, bone marrow, genitourinary tract, and skin.
   - ❑ In hyperendemic counties in northern Wisconsin, health care providers maintain an index of suspicion for blastomycosis, allowing recognition in the initial pulmonary disease phase.
   - ❑ Chest radiographs are highly characteristic for blastomycosis, generally showing a localized infiltrate.

2. The incidence rate for blastomycosis in Wisconsin varies from as low as 0.17 cases per 100,000 in the current study to as high as 101.3 cases per 100,000 in the hyperendemic area of Eagle River, Wisconsin.
   - ❑ True
   - ❑ False

3. Which of the following statements concerning the findings in the present study is false?
   - ❑ Being a current or former smoker was a predisposition to infection with *Blastomyces dermatitidis.*
   - ❑ Although pulmonary involvement was noted in 85%, more than a quarter of patients had extrapulmonary disease as well.
   - ❑ Serological studies were the most useful method of making the diagnosis of blastomycosis.
   - ❑ In a majority of the cases, symptoms and signs suggestive of bacterial pneumonia were treated with various antibacterials prior to the diagnosis of blastomycosis.
   - ❑ Skin lesions were the most common manifestation of extrapulmonary disease.

4. Maintaining a high level of suspicion for blastomycosis in patients presenting with pulmonary symptoms and signs with or without extrapulmonary manifestations is the key to making the diagnosis of this disorder and its prompt treatment.
   - ❑ True
   - ❑ False

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Immediate Total Parenteral Nutrition After Radical Cystectomy and Urinary Diversion

Khanh N. Pham, MD; Ian W. Schwartz, MD; Tullika Garg, MD; Peter Langenstroer, MD; Michael L. Guralnick, MD; William A. See, MD; R. Corey O'Connor, MD

ABSTRACT

Introduction: The purpose of this study is to determine if administration of total parenteral nutrition (TPN) immediately following radical cystectomy and urinary diversion provides significant recovery benefit when compared to patients who did not receive TPN.

Methods: Retrospective chart review was performed on patients who underwent open radical cystectomy and urinary diversion from February 2002 to June 2010. Patients were divided into 2 cohorts—those who received immediate postoperative TPN and those who did not. Preoperative demographics, length of hospital stay, time until tolerating a regular diet and early postoperative complications of the 2 groups were extracted and compared.

Results: One hundred seventy-four patients (104 receiving TPN, 70 without TPN) were available for analysis. No significant difference in preoperative characteristics, length of hospital stay, estimated blood loss, or time until tolerating a general diet between the 2 groups was noted. With regard to complications, the incidence of bacteremia was significantly higher in the TPN vs non-TPN cohort (9% vs 1%, $P < 0.05$).

Conclusion: Immediate administration of TPN following radical cystectomy and urinary diversion does not provide a significant postoperative benefit and may lead to an increased risk of bacteremia.

INTRODUCTION

Radical cystectomy with urinary diversion is the gold standard treatment modality for muscle-invasive urothelial carcinoma of the bladder. Gastrointestinal dysfunction commonly is seen after the procedure and remains the most prevalent cause of delayed enteral feeding and discharge.[1-4] Historically, total parenteral nutrition (TPN) has been used to provide an alternative means of caloric intake while awaiting return of bowel function.[5] However, parenteral nutrition is costly and may lengthen recovery and increase surgical morbidity.[6] Previously published studies have shown that TPN does not influence the overall mortality rate of surgical or critically ill patients[7] and its use should be limited to patients with specific indications.[8,9]

In the urologic literature, only 2 cohort trials in the last 25 years have specifically examined the use of TPN in patients undergoing cystectomy and urinary diversion.[10,11] Neither study demonstrated any significant recovery benefit with its routine use. Despite these findings, the standard use of TPN is common in many centers in an attempt to aid convalescence.[6] The purpose of this study was to determine if administration of TPN immediately following radical cystectomy and urinary diversion provided a significant recovery benefit when compared to patients who did not receive immediate TPN.

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METHODS

Following institutional review board approval, we retrospectively examined the medical records of all patients who underwent open radical cystectomy with urinary diversion from February 2002 to June 2010. Patients with incomplete medical records, history of abdominal/pelvic radiotherapy or bowel disease were excluded. The extirpative portion of the procedure was performed by one of 2 fellowship-trained uro-oncologic surgeons (WAS, PL) while the urinary diversions were constructed by one of 2 fellowship-trained reconstructive urologic surgeons (MLG, RCO). The type of urinary diversion utilized (ileal conduit, Indiana pouch, or orthotopic ileal neobladder) was based on patient/surgeon preference and overall patient health. The decision to administer TPN was dictated by surgeon preference as 1 surgeon (WS) preferentially started immediate TPN on all patients following radical cystectomy. Standard formula TPN (Table1) was administered on postoperative day 0 via a central venous catheter placed intraoperatively using aseptic technique by the anesthesiology service. Patients not receiving TPN did not routinely undergo central

venous catheter placement. Orogastic tube decompression was utilized intraoperatively for all patients. The orogastic tube was removed at the time of endotracheal extubation. Postoperatively, a nasogastric tube was placed to manage delayed return of bowel function on an as-needed basis. Central lines were flushed with saline or heparin every 8 hours and covered with a bio-occlusive dressing. Central venous catheters were changed every 6 to 7 days until removal. Patients were started on a clear liquid diet following passage of flatus. Promotility agents were not routinely used to facilitate return of bowel function. Tolerance of a clear liquid meal prompted advancement to a general diet. TPN was discontinued after a patient tolerated a general diet.

Preoperative characteristics including patient age, gender, exposure to neoadjuvant chemotherapy and American Society of Anesthesiologists (ASA) class were recorded. Neoadjuvant chemotherapy with gemcitabine/cisplatin or methotrexate/vinblastine/doxorubicin/cisplatin was given to select patients prior to 2008 and nearly all radical cystectomy patients since 2008. Additional information abstracted from the medical record included length of hospital stay, time until tolerating a general diet, type of urinary diversion, estimated intraoperative blood loss, and final surgical pathology. Postoperative complications occurring within 30 days of cystectomy related to TPN/central venous catheter use were documented including bacteremia, venous thromboembolic events, uncontrolled hyperglycemia, cardiac arrhythmias, wound infection, or the need for additional minimally invasive procedures or reoperation. Bacteremia was defined as postoperative fevers >100.5°F associated with 2 separate site, positive blood cultures. Uncontrolled hyperglycemia was defined as any glucose level >200 on 3 readings when receiving TPN. Wound infection, which included superficial and deep infections, required a positive wound culture and associated clinical signs of infection. Need for reoperation referred to any operative procedure within 30 days of cystectomy that resulted from a complication arising from the original surgery.

Patients were divided into 2 cohorts (immediate TPN vs no TPN) and analyzed. Student's *t* test or Fisher's exact test were used to determine statistical significance.

RESULTS

Inclusion criteria were met by 174 patients: 104 (60%) received TPN and 70 (40%) did not. Demographic and perioperative information for the 2 groups are listed in Tables 2 and 3. No significant statistical differences were noted between the 2 cohorts regarding preoperative characteristics, type of urinary diversion, intraoperative blood loss, final pathology, time to tolerating a regular diet, or mean hospital stay. When comparing the 2 cohorts, the type of urinary diversion did not influence time to return of bowel function.

Nasogastric tubes were placed postoperatively to manage delayed return of bowel function in 11 (11%) TPN patients and 9 (13%) patients who did not receive immediate postoperative TPN. Early postoperative patient complications are recorded in Table 4. The 2 groups demonstrated no statistical difference in complication frequency with the exception of bacteremia. Bacteremia was seen in 9% of immediate TPN patients and 1%

Table 1. Standard Total Parenteral Nutrition (TPN) Formula

Protein	1.5 g/kg/day
Dextrose	3.5 g/kg/day
Fat	0.75 g/kg/day
Total kcal	25 kcal/kg/day
Electrolytes	
70 mEq NaCl	
30 mMol KPhos	
10 mEq Mg sulfate	
10 mEq Ca gluconate	
MVI	10 mL/day
Trace Elements	1 mL/day

Abbreviations = MVI, multivitamin infusion; mEq, milliequivalent; mMol, millimole

Table 2. Preoperative Demographic Information

	TPN (n=104)	No TPN (n=70)	*P* value
Mean age (range)	65.1 (39-85)	64.4 (45-89)	NS
Gender (M:F)	78:26	54:16	NS
Receiving neoadjuvant chemotherapy (%)	38 (37%)	27 (39%)	NS
ASA class	2.7 (1-4)	2.9 (2-4)	NS

Abbreviations = TPN, total parenteral nutrition; ASA, American Society of Anesthesiologists; NS, not significant.

Table 3. Perioperative Characteristics

	TPN (n = 104)	No TPN (n = 70)	*P* value
Type of diversion			
Ileal conduit	57 (54%)	45 (64%)	NS
Neobladder	35 (34%)	18 (26%)	NS
Indiana pouch	12 (12%)	7 (10%)	NS
EBL in mL (range)	803 (200-2500)	752 (200-2400)	NS
Final pathology			
P0[a]	8 (8%)	4 (6%)	NS
Ta – T2[b]	58 (56%)	44 (63%)	NS
T3 – T4[b]	37 (36%)	22 (31%)	NS
Sarcoma	1 (1%)	0 (0%)	NS
Mean days to general diet (range)	6.2 (2–25)	5.9 (2–18)	NS
Hospital stay in days (range)	9.1 (4–36)	8.6 (5–20)	NS

Abbreviations = TPN, total parenteral nutrition; EBL, estimated blood loss.
[a]No detectable disease
[b]Tumor stage based on American Joint Committee on Cancer (AJCC) standard

Table 4. Early Postoperative Complications

Morbidity	TPN (n = 104)	No TPN (n = 70)	*P* value
Bacteremia (%)	9 (9%)	1 (1%)	<0.05
Thromboembolic events (%)	6 (6%)	5 (7%)	NS
Uncontrolled hyperglycemia (%)	2 (2%)	1 (1%)	NS
Arrhythmia (%)	4 (4%)	4 (6%)	NS
Wound infection (%)	8 (8%)	5 (7%)	NS
Reoperation (%)	8 (8%)	3 (4%)	NS

Abbreviation = TPN, total parenteral nutrition.

of the non-TPN group ($P<0.05$). Blood cultures/catheter tips grew *S aureus* in 7 patients and *E coli* in 3 patients. Additional procedures or reoperation were required in 8 (8%) patients in the TPN group due to stomal necrosis, pelvic abscess, intraabdominal hematoma, enterocutaneous fistula, small bowel obstruction, empyema requiring chest tube insertion, or ureterointestinal anastomotic leak requiring nephrostomy tube diversion. Three (4%) patients required additional procedures or reoperation in the non-TPN group as a result of a prolonged small bowel obstruction, lymphocele or ureterointestinal anastomotic leak.

DISCUSSION

Postoperative gastrointestinal dysfunction following radical cystectomy and urinary diversion is the most prevalent cause of delayed enteral intake and prolonged hospitalization.[1-4] Inadequate caloric intake may perpetuate postoperative catabolic states and increase complications following gastrointestinal surgery.[12-14] TPN is commonly used in many centers following abdominal surgeries despite previous reports that the benefit of perioperative TPN is limited to severely malnourished patients with gastrointestinal malignancy.[6,15] We sought to determine if patients receiving immediate TPN following radical cystectomy and urinary diversion demonstrated a recovery benefit when compared to a cohort that did not receive immediate TPN.

Our findings showed no recovery benefit with the addition of immediate TPN following cystectomy and urinary diversion. Mean time to tolerating a regular diet and total hospital stay were statistically similar between the 2 groups. However, patients receiving TPN in the immediate postoperative setting were found to have a significantly higher rate of bacteremia (9% vs 1%, $P<0.05$). Similar to our study, Roth and colleagues prospectively reported an increase in infectious complications with no improvement in gastrointestinal function in patients receiving TPN following radical cystectomy and urinary diversion.[10] Additionally, Meffezzini et al found that early TPN after radical cystectomy did not appear to improve nutritional parameters or return of bowel function in an elderly population.[11]

An estimated 200,000 nosocomial bloodstream infections occur each year—90% related to the use of central venous catheters.[16] In addition, TPN administration has been found to be a significant risk factor for central venous catheter infection, possibly related to hyperglycemia.[17-20] In our study, we did find a significant increase in bloodstream infections in our cohort that received immediate postoperative TPN. Uncontrolled hyperglycemia, however, was not different between the 2 groups. We do acknowledge that our definition of uncontrolled hyperglycemia (any glucose level > 200 on 3 readings) may not have captured all hyperglycemia episodes.

There are several limitations to our study. First, our investigation was retrospective and, therefore, subject to confounding variables and biases associated with such a design. Second, there was a potential bias as 1 surgeon (WS) preferentially used immediate postoperative TPN with all cystectomy and diversion patients. Preoperative demographics between the 2 groups, however, were similar. Furthermore, the collection of pre- and postoperative nutritional parameters would have been useful to better assess the potential benefits of TPN. Unfortunately, nutritional parameters only were checked in select (presumed malnourished) patients, not all patients. Despite the limitations of our study, our findings spanning an 8-year period suggest that immediate TPN does not provide a significant recovery benefit following open cystectomy and urinary diversion.

CONCLUSION

Immediate administration of TPN after radical cystectomy does not provide a significant postoperative benefit and appears to contribute to an increased risk of bacteremia in the early postoperative period. Our findings do not support, and we no longer routinely use, immediate postoperative TPN following cystectomy and urinary diversion.

Funding/Support: None declared.

Financial Disclosures: None declared.

REFERENCES

1. Shabsigh A, Korets R, Vora KC, et al. Defining early morbidity of radical cystectomy for patients with bladder cancer using a standardized reporting methodology. *Eur Urol.* 2009; 55(1): 164-174.

2. Chang SS, Cookson MS, Baumgartner RG, Wells N, Smith JA. Analysis of early complications after radical cystectomy: results of a collaborative care pathway. *J Urol.* 2002; 167(5):2012-2016.

3. Maffezzini M, Campodonico F, Canepa G, Gerbi G, Parodi D. Current perioperative management of radical cystectomy with intestinal urinary reconstruction for muscle-invasive bladder cancer and reduction of the incidence of postoperative ileus. *Surg Oncol.* 2008; 17(1): 41-48.

4. Lawrentschuk N, Colombo R, Hakenberg OW, et al. Prevention and management of complications following radical cystectomy for bladder cancer. *Eur Urol.* 2010; 57(6):983-1001.

5. ASPEN Board of Directors and the Clinical Guidelines Taskforce. Guidelines for the use of parenteral and enteral nutrition in adult and pediatric patients. *JPEN J Parenter Enteral Nutr.* 2002; 26(1 Suppl):1SA-138SA.

6. Barrass BJ, Thurairaja R, Collins JW, Gillatt D, Persad RA. Optimal nutrition should improve the outcome and costs of radical cystectomy. *Urol Int.* 2006; 77(2):139-142.

7. Heyland DK, MacDonald S, Keefe L, Drover JW. Total parenteral nutrition in the critically ill patient. A meta-analysis. *JAMA.* 1998; 280(23):2013–2019.

8. Perioperative total parenteral nutrition in surgical patients. The Veterans Affairs total Parenteral Nutrition Cooperative Study Group. *N Engl J Med.* 1991; 325(8):525–532.

9. Scolapio JS. A review of the trends in the use of enteral and parenteral nutrition support. *J Clin Gastroenterol.* 2004; 38(5):403-407.

10. Roth B, Birkhäuser FD, Zehnder P, et al. Parenteral nutrition does not improve postoperative recovery from radical cystectomy: results of a prospective randomised trial. *Eur Urol.* 2012; doi: 10.1016/j.eururo.2012.05.052. Epub ahead of print.

11. Maffezzini M, Gerbi G, Campodonico F, Parodi D. A multimodal perioperative plan for radical cystectomy and urinary intestinal diversion: effects, limits and complications of early artificial nutrition. *J Urol.* 2006; 176(3):945-948.

12. Makela JT, Kiviniemi H, Laitinen S. Risk factors for anastomotic leakage after left-sided colorectal resection with rectal anastomosis. *Dis Colon Rectum.* 2003; 46(5):653–660.

13. Golub R, Golub RW, Cantu R Jr, Stein HD. A multivariate analysis of factors contributing to leakage of intestinal anastomoses. *J Am Coll Surg.* 1997; 184(4):364–372.

14. Khoury GA, Waxman BP. Large bowel anastomosis: I. The healing process and sutured anastomoses. A review. *Br J Surg.* 1983; 70(2):61–63.

15. Ward N. Nutrition support to patients undergoing gastrointestinal surgery. *Nutr J.* 2003; 2:18-22.

16. Marvaso A. Central venous catheter related infections. *Infez Med.* 2000; 8(4):202-210.

17. Peter JV, Moran JL, Phillips-Hughes J. A meta-analysis of treatment outcomes of early enteral versus early parenteral nutrition in hospitalized patients. *Crit Care Med.* 2005; 33(1):213-220.

18. Zaloga GP: Parenteral nutrition in adult inpatients with functioning gastrointestinal tracts: assessment of outcomes. *Lancet.* 2006; 367(9516):1101-1111.

19. Dissanaike S, Shelton M, Warner K, O'Keefe GE. The risk for bloodstream infections is associated with increased parenteral caloric intake in patients receiving parenteral nutrition. *Crit Care.* 2007; 11(5):R114.

20. Chen HS, Wang FD, Lin M, Lin YC, Huang LJ, Liu CY. Risk factors for central venous catheter-related infections in general surgery. *J Microbiol Immunol Infect.* 2006; 39(3):231-236.

The Epidemiology of Maternal Overweight in Dane County, Wisconsin

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ABSTRACT

Background: Research shows that maternal obesity leads not only to adverse pregnancy outcomes but also can act as a predictor of poor health of future generations. The Public Health Madison & Dane County Fetal and Infant Mortality Review Board observed poor health associated with prepregnancy BMI ≥ 25, prompting further exploration of this issue in the Dane County, Wisconsin population.

Objective: This is a descriptive epidemiologic study of the problem of maternal overweight defined as prepregnancy BMI ≥ 25 in Dane County.

Methods: Data were abstracted from the Secure Public Health Electronic Records Environment (SPHERE) on births in Dane County in 2011. Risk ratios were used to determine associations between race, education, parity, gravidity, and place of residence and maternal overweight. A *t* test was completed to determine differences in mean age of overweight and healthy weight mothers.

Results: Approximately half (50.6%) of Dane County mothers in 2011 were overweight or obese prepregnancy. Results showed increased risk of overweight for black mothers and multiparous/multigravidous mothers. There was no difference in mean age of overweight and healthy weight mothers. Overweight rates varied considerably by ZIP code of residence.

Conclusion: Rates of maternal overweight vary significantly in Dane County by social and demographic factors. This information can be used to design and target interventions and monitor trends over time.

INTRODUCTION

Associations between prepregnancy BMI ≥ 25 and pregnancy complication observed in the Public Health Madison & Dane County Fetal and Infant Mortality Review (FIMR) prompted further exploration of maternal overweight/obesity. The problematic health effects of maternal obesity on pregnancy, birth outcomes, and health of adult offspring are well established.

Epidemiologic literature illustrates associations between maternal prepregnancy BMI ≥ 25 and adverse health effects on both the pregnancy and the infant, even into adulthood. Some of these adverse health effects include gestational diabetes,[1] hypertensive disorders of pregnancy, including preeclampsia;[1,2] planned and emergent C-sections; as well as stillbirth.[3] Furthermore, research suggests that prepregnancy and prenatal health and nutrition of the mother affect the health of children into adulthood, including glucose metabolism and cardiovascular disease.[4]

The purpose of this study is to describe the problem of maternal overweight in Dane County in terms of person and place. The data will inform public health interventions for Dane County by focusing attention on affected populations to determine root causes, and the study can be repeated in other communities to design and target intervention and monitor trends over time.

The following study included analysis of data from all births in Dane County in 2011 based on the information in terms of person and place stored in the Secure Public Health Electronic Records Environment (SPHERE) database to determine factors associated with maternal prepregnancy BMI ≥ 25. SPHERE is a unique use of an electronic health and public health records system that was developed to integrate medicine and public health. The SHERE database was modeled after a similar system in Minnesota as a reporting tool for 3 programs: Maternal Child Health, Reproductive Health/Family Planning, and Children and Youth with Special Health Care Needs. It includes information from medical and public health records: birth record data, maternal child health activities including case management and home visitation, referrals and outcomes, immunizations and standard prenatal, postpartum, home safety, and child passenger

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seat assessments.[5] The study could be repeated in other communities for upstream definition of the obesity epidemic in Wisconsin.

METHODS

We queried the SPHERE database, including all births in Dane county in 2011. This database includes information from vital records of all births in Wisconsin. We determined the rate of prepregnancy overweight (BMI ≥ 25) among Dane County mothers in 2011. Note that overweight rates include obesity (BMI ≥ 30).

We also explored the variables of self-reported race, educational status, parity, gravidity, age, and place of residence. We defined place of residence as ZIP code of address listed on vital records. We explored both gravidity and parity, due to known limitations of SPHERE parity data.

Statistical analysis included bivariate analyses and *t* test analysis. The outcome for bivariate analyses was maternal prepregnancy BMI ≥ 25, and we completed these analyses for each of the determinant variables, except age. We compared mean age of overweight and healthy weight mothers using a *t* test. We compared ZIP codes with risk ratios of maternal overweight, using the county rate as reference and adjusting for small sample size with Empirical Bayes.[6] We repeated the analysis of ZIP codes correcting for race and educational status.

RESULTS

There were 6024 total births in Dane County in 2011; however, not all factors were recorded for each birth (Table 1). The research group was 73.2% white with the remainder equally split between black, Hispanic, and other races. Education distribution includes 61.2% college graduates and 9.4% without high school diplomas. The age distribution includes 2.9% under 20 years, 39.8% 20-29 years, 36.3% 30-34 years, and 21.0% 35 years or older. The distribution by BMI includes 51.0% with normal BMI (18-25), 2.3% underweight, 24.8% overweight (25-30), and 21.8% obese (>30) (Table 1).

Table 2 presents rates of overweight by race, education, parity, and gravidity. Numbers presented in Table 2 only include those births affected by maternal overweight. Rates of maternal obesity are higher among black and Hispanic women, and multiparous or multigravidous women. A *t* test analysis of age, comparing overweight mothers to those who were not overweight, shows an insignificant age difference (mean age of healthy weight mothers 30.3; mean age of overweight/obese mothers 30.1, *P* value 0.14, 95% CI -0.07, 0.47).

Rates of obesity varied considerably for the 32 ZIP codes of residence in Dane County, from a high of 72.4% in 53508 (Belleville) to a low of 31.1% in 53705 (Shorewood Hills, Spring Harbor, and Hill Farms neighborhoods) (Figure). Rates for ZIP codes with more than 100 affected births are listed in Table 2.

Table 1. Frequency Distribution

	Count	Percent of Total
Race		
White	4410	73.2%
Black	479	8.0%
Hispanic	583	9.7%
Other	552	9.2%
Total (N)	6024	100%
Education		
<High school graduate	562	9.4%
High school graduate	916	15.2%
Some college	854	14.2%
College degree	3676	61.2%
Total (N)	6008	100%
Age		
<20	174	2.9%
20-29	2398	39.8%
30-34	2186	36.3%
≥35	1266	21.0%
Total (N)	6024	100%
Parity		
Multiparous	3270	55.1%
Primaparous	2668	44.9%
Total (N)	5938	100%
Gravidity		
Multigravid	3697	62.3%
Primagravid	2241	37.7%
Total (N)	5938	100%

Distribution of race, age, education, parity and gravidity among women delivering children in 2011 in Dane County, Wisconsin.

Analysis of ZIP code when corrected for race and education through multiple regression reveal that variations persist (data not presented).

DISCUSSION

The results show that maternal overweight/obesity is a significant problem in Dane County, with nearly half of mothers in 2011 having BMI ≥ 25 prior to pregnancy. It must be noted that prepregnancy BMI from vital records often is taken from the medical record flow sheet, which either contains the weight at the first prenatal visit or a self-reported prepregnancy weight. These 2 numbers could cause overestimations or underestimations of the true maternal prepregnancy obesity rate. Despite the limitations of these data, they are the most reliable, accessible information, and the analysis completed is very informative. There was variation in maternal overweight with race, education, parity, gravidity, and place of residence. Age does not appear to be a contributing factor.

Several sociodemographic variables were associated with maternal overweight. Black mothers were more likely to be overweight than white mothers, which is a similar disparity to maternal mortality rates and other studies of overweight and obesity.[7]

Table 2. Prevalence of Overweight

	Overweight (no. of women)	Prevalence	Relative Risk[a]	95% CI
Race				
White	1939	44.0	1	—
Black	320	66.8	1.5	(1.4, 1.6)
Hispanic	300	51.5	1.2	(1.1, 1.3)
Other	212	38.4	0.9	(0.9, 1.0)
Education				
<High school graduate	307	54.6	1.4	(1.3,1.5)
High school graduate	524	57.2	1.4	(1.4,1.6)
Some college	489	57.3	1.5	(1.4,1.6)
College graduate	1446	39.3	1	—
Parity				
Multiparous	1634	50.0	1.2	(1.1,1.2)
Primaparous	1137	42.6	1	—
Gravidity				
Multigravidous	1828	49.4	1.2	(1.1,1.2)
Primagravidous	943	42.1	1	—
ZIP Code of Residence				
53713 (S Madison)	266	58.3	1.3	(1.1, 1.4)
53714 (NE Madison)	134	57.8	1.2	(1.0,1.5)
53589 (Stoughton)	107	56.0	1.2	(1.0, 1.5)
53704 (NW Madison, Sherman, Maple Bluff)	342	53.0	1.1	(1.0, 1.3)
53716 (Monona)	109	52.7	1.1	(0.9, 1.4)
53590 (Sun Prairie)	270	49.4	1.1	(0.9, 1.2)
53711 (Fitchburg, Midvale Heights, Allied, Westmorland)	273	45.6	1	(0.9, 1.1)
53719 (W Madison)	213	44.2	0.9	(0.8, 1.1)
53705 (Shorewood Hills, near Westside of Madison)	104	31.1	0.7	(0.6, 0.8)

[a]Reference groups for determination of relative risks were white, college graduate, primaparous, and primgravidous. Standardized relative risk (RR) is presented for ZIP code analysis based on average rate of overweight in the entire county. Confidence intervals for standardized RR calculated with Boice and Monson method. Only ZIP codes with >100 births affected by maternal overweight are presented in this table.

The research necessary for explanation and application of these findings to public health interventions is currently underway, and despite the ease with identifying race in data it seems likely to be affected by many confounding social factors.[8] Education is the only component of socioeconomic status available on the SPHERE database to link to BMI. The variation with education was not statistically significant, nor was it linear, and is therefore difficult to interpret. We suspect that the data are complicated by confounding factors such as the factors that determine completion of a college degree. Finally, multiparity and multigravidity were associated with increases in maternal overweight rates in our study. Though there is a more specific definition among obstetricians,[9] parity in SPHERE data includes only live births and late fetal deaths, without specifics. Similar findings with gravidity strengthen the association and have implications for interpartum weight counseling.

It is important to note the unique demographics of the population of women giving birth in Dane County. The county is home to a large university, a private 4-year college and multiple technical colleges. As such, the population is relatively highly educated, with approximately 75% of women delivering in 2011 having college degrees or some college education. According to national demographic data, there has been a trend toward increasing maternal age and higher education of mothers—up to 54% with some college in 2008.[10] In addition, Dane County has a lower rate of births among teens compared to the rest of the state (19.4 vs 30.6 births/1,000 teens, respectively).[11] These characteristics may explain differences between the overall rates of maternal obesity in Dane County, compared with other communities in Wisconsin.

Other researchers have emphasized the contribution of place in the obesity epidemic, which makes the observed variation in risk ratio of maternal BMI ≥25 by ZIP code particularly interesting.[12] Though many have observed and recognized the importance of variation in health determinants by place at the county level,[13] variation on a smaller scale emphasizes the importance of local community health factors, such as food and exercise resource availability. The evidence for place contributing to health is strengthened by variations that persist despite race and educational status. Surveillance data are useful for targeting interventions in those neighborhoods with the highest risk and monitoring trends over time. Despite the limitations of ZIP codes, which generally do not define social communities, ZIP code is an accessible identifier of at risk populations to help guide public health resource allocation and connect databases such as SPHERE and medical records.

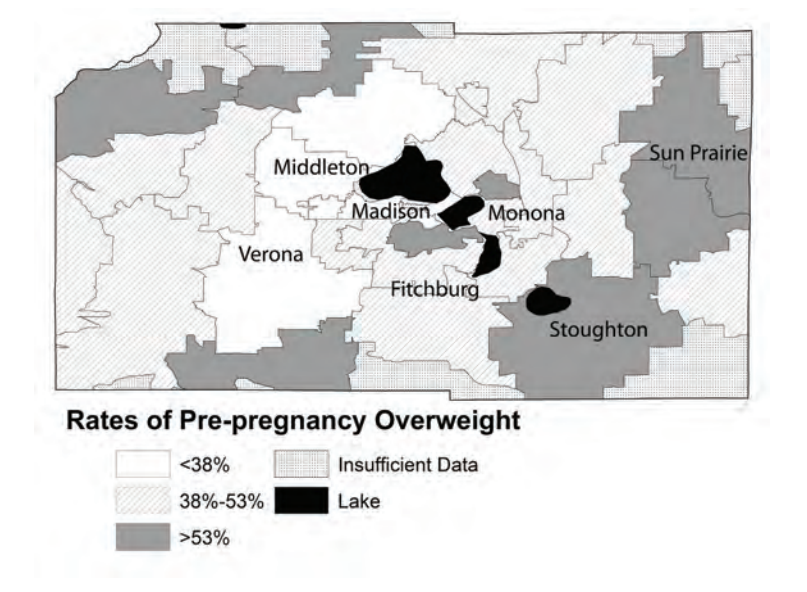
CONCLUSION

This study identified 3 factors associated with maternal overweight in race, parity/gravidity, and place of residence. This study group and Public Health Madison & Dane County Fetal and Infant Mortality Review focused efforts on exploring ZIP code as a contributor of health by exploring sociodemographic factors of 1 ZIP code. We have designed an interview study of women in the community to increase understanding of the life experience of the community members in an attempt to identify modifiable contributors.

Electronic health records have been implemented widely in efforts to track quality care measurements, such as those set by the

Wisconsin Collaborative for Healthcare Quality. The SPHERE database integrates measures of health care quality as well as public health initiatives and demographic information, allowing for a more comprehensive understanding of contributors to health. It can be used widely to improve understanding of community health. Thus far, few studies have been published illustrating the uses of the SPHERE database. This study serves as an example of 1 application of the data collected. The use of the SPHERE database can be applied across the state for a new approach to defining the obesity epidemic and designing successful public health interventions by improving health from the beginning of life.

Figure. Rates of Maternal Prepregnancy Overweight[a] by ZIP Code



[a]Maternal overweight is defined as prepregnancy BMI ≥25.

Acknowledgment: The authors would like to thank Anne Roubal of the UW Population Health Institute for preparing the map of Dane County.

Funding/Support: None declared.

Financial Disclosures: None declared.

REFERENCES

1. Weiss JL, Malone FR, Emig D, et al. Obesity, obstetric complications and cesarean delivery rate: A population-based screening study. *Am J Obstet Gynecol.* 2004;190(4):1091-1097.

2. Gaillard R, Steegers EA, Hofman A, Jaddoe VW. Associations of maternal obesity with blood pressure and the risks of gestational hypertensive disorders. The Generation R Study. *J Hypertension.* 2011;29(5): 937-944.

3. Ovesen P, Rasmussen S, Kesmodel U. Effect of prepregnancy maternal overweight and obesity on pregnancy outcome. *Obstet Gynecol.* 2011;118(2 Pt 1):305-312.

4. Tomashiro KL, Moran TH. Perinatal environment and its effect on metabolic programming of offspring. *Phisiol Behav.* 2010;100(5):560-566.

5. Landis MJ, Kratz S, Spaans-Esten L, Hanraham LP. SPHERE: Tracking public health improvement with electronic records. *WMJ.* 2006:106(3):116-119.

6. Clayton D, Kaldor J. Empirical Bayes estimates of age-standardized relative risks for use in disease mapping. *Biometrics.* 1987;43(3):671-681.

7. Mascola MA, Schellpfeffer MA, Kruse TK, Conway AE, Kvale KM, Katcher ML. Pregnancy-associated deaths and pregnancy-related deaths in Wisconsin, 1998-2001. *WMJ.* 2004;103(5): 61-66.

8. Robert SA, Reither EN. A multilevel analysis of race, community disadvantage, and body mass index among adults in the US. *Soc Sci Med.* 2004;59(12):2421-34.

9. DeCherney A, Nathan L, Goodwin TM, Laufer N, Roman A. Current Diagnosis & Treatment, Obstetrics & Gynecology. 11th ed. New York: McGraw-Hill; 2012.

10. Livingston G, Cohn D. The new demography of American motherhood. Pew Research Social and Demographic Trends Report. May 6, 2010. http://www.pewsocialtrends.org/2010/05/06/the-new-demography-of-american-motherhood/ Accessed January 10, 2014.

11. Layde M, Remington P. Geographic and racial variation in teen pregnancy rates in Wisconsin. *WMJ.* 2013;12(4):169-172.

12. Gordon C, Purciel-Hill M, Ghai NR, Kaufman L, Graham R, Van Wye G. Measuring food deserts in New York City's low-income neighborhoods. *Health Place.* 2011;17(2):696-700.

13. Rohan AMK, Booske BC, Remington PL. Using the Wisconsin County Health Rankings to catalyze community health improvement. *J Public Health Manag Pract.* 2009;15(1):24-32.

Evaluating the Implementation of a Primary Care Weight Management Toolkit

Lynn Stiff, MS, RD; Lee Vogel, MD; Patrick L. Remington, MD, MPH

ABSTRACT

Objective: With over one-third of adults in the United States classified as obese, new recommendations call for screening all adults for obesity at outpatient visits. The UW Health Fox Valley Clinic does not actively screen for obesity. The objective of this project was to test the feasibility of an obesity screening and brief intervention protocol.

Process: A modified version of the *Promoting Healthier Weight in Primary Care* toolkit was implemented into a family medicine practice for 6 weeks. Patients (N = 88) were asked about visit satisfaction and acceptability of weight-focused conversation. Providers (N = 22) were asked about acceptability and feasibility of use.

Outcome: Almost all patients (97.7%) found the conversation acceptable. Providers found the toolkit helpful, not confusing for their patients, and easy to use. Time was the greatest barrier.

BACKGROUND

The prevalence of obesity in the United States and the consequences for population health are well documented.[1-3] It is estimated that 29% of Wisconsin adults are obese.[4] Currently, nutrition and physical activity are discussed at less than 50% of ambulatory care visits.[5] Roughly 20% of the US population uses the health care system each month, making it an ideal location for interventions.[5] In 2012, the United States Preventive Services Task Force released grade B recommendations that all adults should be screened for obesity at outpatient visits, and all patients who screen positive should be referred to "intensive, multicomponent behavioral interventions."[6] Previously this was not a realistic option for many physicians, as most insurance companies did not reimburse for the diagnosis code "obesity." However, in November 2011, Medicare approved reimbursement for intensive weight management by primary care providers, making related interventions more feasible in the primary care setting.[7]

METHODS

This 6-week quality improvement study was conducted at a family medicine clinic in Appleton, Wisconsin to evaluate the feasibility and acceptability of using a toolkit (*Promoting Healthier Weight in Adult Primary Care*[8]) for brief interventions related to obesity. All participants were at least 18 years of age or older. The study was reviewed by the University of Wisconsin Health Sciences Institutional Review Board and was determined to not require review, because as a quality improvement project it does not constitute research, as defined under 45 CFR 46.102(d).

Toolkit

The toolkit was created by the Vermont Area Health Education Centers (AHEC) Network, Vermont Department of Health, and University of Vermont College of Medicine and incorporates evidence-based strategies (screening guidelines, assessing readiness to change, and goal setting).[8] The toolkit is a 20-page packet that includes a clinic algorithm to guide visits, education for providers on assessing readiness to change and applying effective motivational interviewing techniques, a 1-page patient weight and health profile to be completed during the visit, and optional patient resources. While based in strong evidence, the toolkit has not been evaluated for feasibility or effectiveness in a primary care setting. For this project, the toolkit was adapted to meet the needs of the clinic using its electronic medical record system. All clinic staff were trained on the toolkit. Patient education packets were developed specifically for each stage of change. These included theory-based materials that patients in the respective stage may find useful, such as how weight influences health outcomes (precontemplation), tips for assessing and overcoming

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barriers (contemplation), meal planning (preparation), tracking progress (action), and preventing relapse (maintenance).

Subject Selection

All clinic providers (physicians, residents, physician assistant), nurses, medical assistants, and administrative employees participated.

Only patients with nonacute visits were considered. Non-acute visits included physicals, chronic disease management visits, and follow-ups to previous acute visits (eg, follow-up to gallstones). In addition, clinical discretion was used with screening patients with sensitive reasons for visit (eg, depression, eating disorder, metastatic cancer). Medical assistants reviewed eligible patients with providers and conducted the screening process. A waist circumference and BMI were calculated and noted in the progress note or the medical record. Patients with a BMI ≥ 25 and/or waist circumference ≥ 35" (female) and ≥ 40" (males) were flagged; this included inserting a template into "patient instructions" of the medical record, leaving a post-visit patient survey on the desk in the patient room to alert the provider that the patient screened positive, and marking the patient's medical record with a white dot to alert clinic staff that the patient screened positive.

Procedure for Patients who Screen Positive

Providers implemented the toolkit using their own personal style. Providers assessed readiness to change, collaborated with the patient to develop a specific nutrition, physical activity, or weight goal that were documented as a "prescription," and provided an education packet specific to the patient's stage of change.

Surveys

Providers were asked to complete anonymous pre-implementation and post-implementation surveys using Qualtrics software (Qualtrics, Provo, Utah). Surveys included Likert-scale statements and open-ended, rating, and yes/no questions. Patients were asked to complete anonymous post-visit surveys if the toolkit was used during their visit. The survey included 11 Likert-scale statements. The number of patients eligible to complete surveys was not collected but can be estimated at 30 patients per week, for a total of 180 patients during the 6-week survey period.

Measuring Acceptability

Patient acceptability was measured by the percent of patients reporting an acceptable response to a statement. The overall statement acceptability rate was calculated by determining the number of patients reporting that the statement was acceptable. The overall toolkit acceptability rate was measured by averaging the statement acceptability for each statement.

Measuring Feasibility

Feasibility was measured by time required for use, ease of use, and likeliness to use in future practice. Ease of use and likeliness to use in practice were ranked on a scale of 1-10, with 1 being low and 10 being high.

Table 1. Percent of Patients Who Agreed with the Following Statements

Agreement	Statement
98%	My physician thinks my health habits and weight are important.
97%	I liked the way the physician talked to me about my health habits.
97%	I thought talking to my physician about my health habits was helpful.
94%	I want to improve my health through diet and exercise.
94%	I need to improve my health through diet and exercise.
91%[a]	I was offended by questions asked by my physician.
90%	The goals I set with my physician will guide my decisions.
90%	I received information and tools during my visit so that I can reach my health goals.
89%	I am more likely to make dietary or lifestyle changes now that I talked to my physician.
82%	I hope my physician uses this toolkit at my future visits.
70%	I plan to tell someone else about what I learned today from my physician.

[a]Percent who disagreed with this statement

RESULTS

Patient Post-visit Survey

Eighty-eight patient surveys were obtained (response rate of approximately 50% of eligible patients). These 88 patients had an average acceptability response of 90%. Individual statement acceptable response rates are noted in Table 1. Seven out of 88 patients had at least 1 unacceptable response. Of these patients, only 2 (2.3%) had a survey response that was less than 75% acceptable (3 or more responses with <75% acceptable responses). These results show 97.7% acceptability by patients.

Provider Pre-implementation Data

Eighteen of the 22 providers responded to the pre-implementation survey (82% response rate). All providers (100%) thought it was important to talk to patients about their weight and health habits. Eleven of the 18 providers (61%) indicated their reservation with the toolkit is the added time it might take.

Provider Post-implementation Data

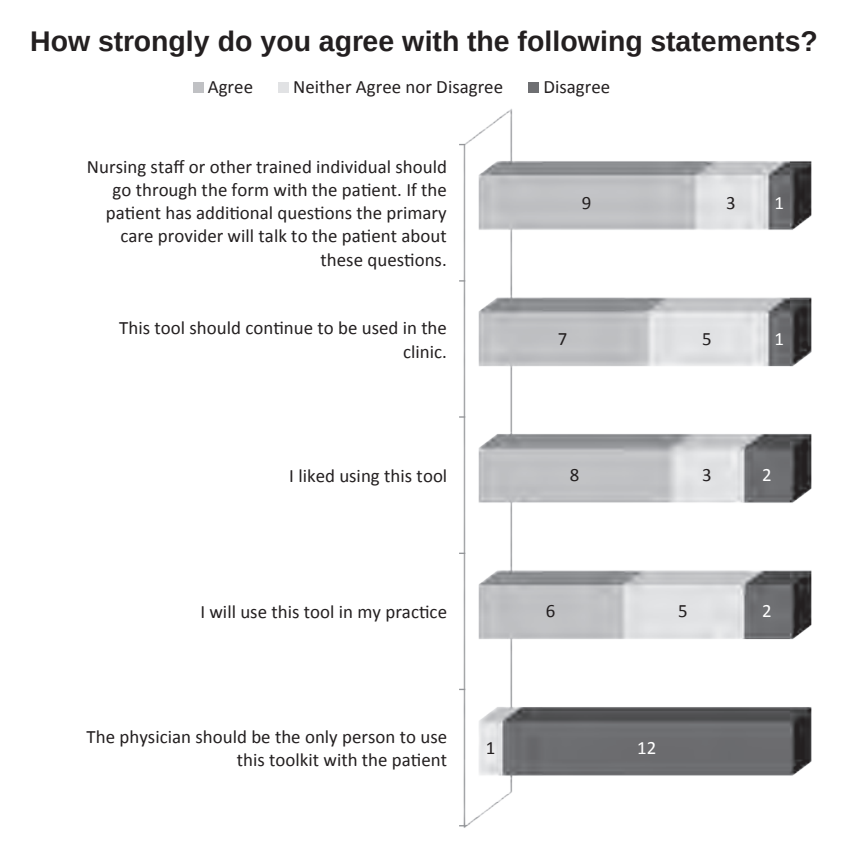
Thirteen providers completed the post-implementation survey (59% response rate). The pre- and post-surveys were compared to assess changes in agreement after using the toolkit. All providers still agreed that "it is important to discuss weight and disease prevention with my patients." The number of neutral responses dropped for all statements. Table 2 shows the change in agreement for each statement. Estimated time spent using the toolkit was 3-7 minutes (54%), 8-11 minutes (23%), or >12 minutes (23%). Only 23% of providers said they ever spent less than 3 minutes using the toolkit, while 38% stated they spent more than 12 minutes at least once. Despite this, 85% of providers stated they felt the extra time spent with the patient on the toolkit was beneficial for the patient.

Table 2. Change in Agreement for Provider Presurvey and Postsurvey

Positive Statements	Percent Who Agree: Pretest (N=18)	Post-test (N=13)	Change
I think it is important to discuss weight and disease prevention with my patients.	100%	100%	0%
This toolkit will be helpful.	35%	77%	+42%
This toolkit seems easy to use.	22%	69%	+47%
This toolkit will allow me to have an important conversation with my patient that I may not have had otherwise.	50%	46%	-4%
Negative Statements[a]	**Percent Who Disagree: Pretest (N=18)**	**Post-test (N=13)**	**Change**
This toolkit took too much time.	17%	8%	-9%
If my patient wants to talk about his/her weight and health habits, s/he will bring them up.	72%	46%	-26%
There are already enough opportunities to talk to my patient about weight and health and no need for new toolkits.	39%	62%	+23%
This toolkit decreased my ability to deliver quality care to my patients.	n/a	69%	n/a
This toolkit was confusing for my patients.	28%	77%	+49%
I will only talk to my patients about weight or health habits if they ask or bring them up.	83%	100%	+17%

A positive change is favorable for each positive statement, indicating an increase in agreement. A negative change is favorable for each negative statement, indicating a decrease in disagreement with negatives statements of the toolkit.
[a]Note that these statements are statements one would hope a physician disagrees with, as they are not in support of the toolkit. An increase in disagreement is a positive finding.

Figure 1. Provider Opinions About the Future Use of the Toolkit (N=13)



Providers were asked how strongly they agreed with 5 statements regarding future use of the toolkit (Figure 1). Over half reported that they "liked using the tool" and that "this tool should continue to be used in the clinic." No providers agreed with the statement "the physician should be the only person to use this toolkit with the patient" and nearly 70% reported that nursing staff should go through the toolkit with the patient and then refer patients for follow-up as appropriate.

DISCUSSION

The purpose of this study was to determine if an obesity screening and counseling toolkit would be an acceptable and feasible option for a screening. The data clearly shows that while the toolkit and conversation were acceptable to the patient, the current form of the toolkit is too time consuming to be used with all patients. The clinic is committed to following the current national recommendation[6] to screen all adult patients for obesity in an efficient and effective manner.

The provider post-survey responses offered insight into the feasibility of using

the toolkit as a screening method. After using the toolkit, 100% of providers stated they would talk to their patients about weight and health without the patient bringing up the topic, and most reported a need for the toolkit. The data clearly show that the toolkit is useful in a primary care setting; 75% of providers found the toolkit helpful and 70% found it easy to use. Qualitative data from the providers indicated the toolkit served as a conversation guide and that its biggest strength was its format. They found the toolkit was well-suited for initiating the conversation and tailoring their education with the patient. They also felt the toolkit was well-suited for a team approach to weight management.

While the toolkit itself was received positively by providers, it appears the process in which the toolkit was implemented needs improvement; 56% of the providers did not feel that using the toolkit allowed them to have an important conversation with their patients that they may not have had otherwise. Survey responses indicate that the time required to use the toolkit appeared to be the most significant and frequently reported barrier, with 90% stating the toolkit took too much time. Many also reported difficulty using the toolkit effectively during visits that were not dedicated to chronic disease management or annual physical exams. These data suggest that the conversation was rushed and was ultimately less meaningful. Given this, we believe that modifications to the toolkit delivery may allow the clinic team to implement this useful tool without overwhelming the provider.

Based on the results of this pilot study, the clinic has assessed possible modifications to the toolkit to improve its feasibility. The next steps in our quality improvement project include:

- Disseminating the toolkit into 2 visits (screening and intervention).
- Standardization of the toolkit with specific roles for medical assistants and providers and improved electronic medical record dot phrases to be used in patient instructions.
- Using trained medical assistants to complete screening and conduct readiness to change.
- Creating a medical assistant position to aid in coordination of the program.
- Ongoing evaluation of progress and acceptance using the PDCA cycle.

While primary care providers will continue to be responsible for carrying out teaching and intervention protocols, they may coordinate with the current on-site health educator. The clinic plans to conduct an effectiveness and feasibility trial of these modifications in the future. Given the current state of obesity, the clinic understands the success of its program can be useful in guiding programs and decision making in other settings. Because of this, members of the project team have been engaged with other community leaders working with obesity management. It is anticipated that the success of future efforts in obesity screening and interventions will require developing processes that address concerns about the time required for use of such toolkits.

Funding/Support: This study was a University of Wisconsin School of Medicine and Public Health Shapiro Summer Research Project and was supported by the Shapiro stipend and UWSMPH Farrell Scholarship.

Financial Disclosures: None declared.

REFERENCES

1. Ogden CL, Carroll MD. Prevalence of Overweight, Obesity, and Extreme Obesity Among Adults: United States, Trends 1960-1962 Through 2007-2008. Division of Health and Nutrition Examination Surveys. June 2010. http://www.cdc.gov/NCHS/data/hestat/obesity_adult_07_08/obesity_adult_07_08.pdf. Accessed January 14, 2014.

2. Must A, Spadano J, Coakley, EH, Field AE, Colditz G, Dietz WH. The disease burden associated with overweight and obesity. *JAMA*. 1999;282:1523-1529.

3. Centers for Disease Control and Prevention. Overweight and Obesity. Reviewed October 21, 2011. http://www.cdc.gov/obesity/index.html. Accessed January 14, 2014.

4. County Health Rankings: Mobilizing Action towards Community Health. 2011 Outagamie, Wisconsin. http://www.countyhealthrankings.org/app/wisconsin/2013/outagamie/county/outcomes/overall/snapshot/by-rank . Accessed January 14, 2014.

5. Department of Health and Family Services. Division of Public Health Wisconsin Nutrition and Physical Activity Program. What Works in...Healthcare. May 2008. http://www.dhs.wisconsin.gov/publications/P4/p40142.pdf. Accessed January 14, 2014.

6. US Preventive Services Task Force. Screening for and management of obesity in adults. Clinical summary of US preventive services task force recommendation. June 2012. http://www.uspreventiveservicestaskforce.org/uspstf/uspsobes.htm. Accessed January 14, 2014.

7. Department of Health and Human Services Centers for Medicare and Medicaid Services. Intensive Behavioral therapy for Obesity. *MLN Matters*. Original Publication March 7, 2012; updated March 9, 2012. http://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNMattersArticles/downloads/MM7641.pdf. Accessed January 14, 2014.

8. Vermont Area Health Education Centers and Vermont Department of Health. Promoting Healthier Weight in Adult Primary Care. First Edition. 2007. http://healthvermont.gov/family/fit/documents/Promoting_Healthier_Weight_toolkit.pdf. Accessed January 14, 2014.

Bilateral Pulmonary Nodules and Mediastinal Lymphadenopathy in a Patient with Sjogren's Syndrome

Vikas Pathak, MD; Jeffrey M. Resnick, MD; Tasbirul Islam, MD, MRCP

ABSTRACT

Bronchus-associated lymphoid tissue is a normal component of the lung's immune system and may be analogous to gut-associated lymphoid tissue, a form of mucosa-associated lymphoid tissue. Bronchial-associated lymphoid tissue lymphoma is a distinct subgroup of low-grade B-cell extranodal non-Hodgkin lymphoma, classified as marginal-zone lymphoma. It is a rare disorder and appears with a distinct clinical and radiological presentation. We report a case of a patient with a history of Sjogren's syndrome who presented with bilateral pulmonary nodules and mediastinal lymphadenopathy, and who was diagnosed as having bronchus-associated lymphoid tissue lymphoma.

CASE PRESENTATION

A 69-year-old white woman with a history of Sjogren's syndrome and chronic dry mouth had a productive cough with whitish sputum for 1 week. She reported having very mild dyspnea on exertion but no orthopnea, no paroxysmal dyspnea, chest pain, or palpitation. She denied any hemoptysis, headache, ear pain, visual changes, or difficulty swallowing. Other than Sjogren's syndrome, she did not have any significant past medical or family history. The patient had a history of smoking (20 packs per year), but had quit about 30 years prior.

The patient looked comfortable without any acute distress. Her vital signs were within normal limits. Examination of the neck revealed diffuse bilateral enlargement of the parotid gland, with minimal tenderness on right parotid gland. Her thyroid was not enlarged. Chest examination revealed bilateral crepitations posteriorly on the base, without any wheeze. The remainder of her systemic examination, including cardiovascular, abdominal, and neurological, was normal.

Laboratory results including complete blood count, basic metabolic panel, and B-type natriuretic peptide were all within normal limits. A chest radiograph demonstrated bilateral interstitial infiltrates without any mediastinal lymphadenopathy. An echocardiogram was normal. A computed tomography (CT) scan of the chest was done to further define the infiltrate and showed bilateral subtle nodular densities, the largest in the right lower lobe measuring 2 cm x 1 cm. There were several smaller bilateral nodules measuring up to 1.1 cm in the left upper lobe (Figure 1). Subcarinal lymph node measuring 2.6 cm x 1.9 cm and bilateral hilar lymph nodes <1 cm in size were found. Bilateral patchy ground glass opacity also was seen.

Because of the history of Sjogren's syndrome, the following were considered in the differential diagnosis: underlying lymphoproliferative disorder, lymphocytic interstitial pneumonitis, vasculitis such as Wegener's granulomatosis, sarcoidosis, amyloidosis, nonspecific interstitial pneumonia, and multifocal bronchioloalveolar carcinoma. Infection was considered unlikely, since she did not have fever or purulent sputum and her white blood cell count was normal. The patient underwent video-assisted thoracic surgery with a wedge biopsy of the right lower lung, which was sent for histopathological examination.

The wedge biopsy of the lung showed extensive involvement of the parenchyma by a lymphoid proliferation of variable intensity, comprised predominantly of small lymphoid and plasma cells (Figure 2A). Apart from the presence of few Dutcher bodies, the plasma cells showed no significant cytologic atypia. The lymphoid infiltrate demonstrated bronchiolar lymphoepithelial lesions, involved walls of medium-sized blood vessels, and extended into the visceral pleura. There was no significant large lymphoid cell component. Few residual atretic non-neoplastic follicles with germinal centers were present. An immunostain for CD20 (Figure 2B) highlighted numerous ill-defined nodules of small B lym-

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phoid cells that aberrantly co-expressed CD43 but were negative for CD5, CD10, and cyclin-D1 (bcl-1). Immunostains for CD20 and cytokeratin cocktail highlighted the lymphoepithelial lesions. The CD23 immunostain, when interpreted in conjunction with the CD20 preparation, demonstrated colonization of residual follicle centers by the B cell proliferation. A CD3 immunostain decorated the background non-neoplastic small T lymphocytes. Chromogenic RNA in situ hybridization (CISH) for lambda and kappa light chains revealed a clear predominance of kappa light chain- over lambda light chain-associated RNA among the plasmacytic component, providing supportive evidence of kappa light chain restriction (Figure 2C). A Congo red stain revealed no amyloid deposition.

Based on the clinical presentation, radiologic appearance, and histologic examination, the patient was diagnosed with pulmonary extranodal marginal zone B-cell lymphoma of mucosa-associated lymphoid tissue, with plasmacytic differentiation. The patient was treated with 6 cycles of R-CVP (rituximab, cyclophosphamide, vincristine, and prednisolone), and continues to do well 12 months after the diagnosis with no symptoms of lymphoma and no evidence of recurrence.

DISCUSSION

Mucosa-associated lymphoid tissue (MALT) is a group of lymphoid tissue scattered along mucosal linings. They protect the body from an enormous quantity and variety of antigens. The tonsils, Peyer patches within the small intestine, and the vermiform appendix are examples of MALT. The nomenclature incorporates location; therefore, MALT includes gut-associated lymphoid tissue (GALT) and bronchial mucosa-associated lymphoid tissue (BALT). Malignancies occurring in MALT are called MALT lymphomas, which are extranodal manifestations of marginal-zone lymphomas.

According to the most recent World Health Organization and Revised European-American Classification of lymphoid neoplasms classification[1,2] marginal zone lymphomas are B-cell non-Hodgkin lymphomas and encompass 3 distinctive subtypes of nodal, primary splenic, and extranodal lymphoma of MALT-type. MALT lymphomas are distinguished from nodal and splenic forms by their different clinical behaviour and cytogenetic characteristics. MALT lymphoma may arise from different anatomical sites including the stomach, skin, conjunctiva, orbit, salivary glands, thyroid, and lung,[3] with the stomach most commonly affected.[4] Lung involvement (BALT) is rare, accounting for less than 1% of all lymphomas.[5] BALT lymphoma includes two-thirds of all the primary non-Hodgkin lymphoma of the lungs.[5]

As the most frequent site of MALT lymphoma, the stomach serves as a model for pulmonary MALT lymphoma. MALT is absent from the lung in normal physiological circumstances. During chronic antigenic stimulation (eg, by *Helicobacter pylori*), MALT can increase in the stomach and undergo secondary lymphomatous transformation arising from marginal zone B-cells. In order to develop, the malignant B-cell clone requires the presence of T-cells specifically directed against *H pylori* antigens. Thus, *H pylori* eradication can lead to complete remission of gastric lymphoma.[6] So far no triggering antigens have been identified in the lung, but chronic antigenic stimulation in certain autoimmune disorders (eg, sarcoidosis, systemic lupus erythematous, rheumatoid arthritis, multiple sclerosis, Hashimoto's thyroiditis, and particularly Sjogren's syndrome) are considered to affect the onset of pulmonary MALT lymphoma.[6,7]

Most patients with BALT lymphoma are asymptomatic, and pulmonary lesions are incidentally discovered on a chest radio-

Figure 1. Computed Tomography Scan of the Chest Showing Bilateral Subtle Nodular Densities

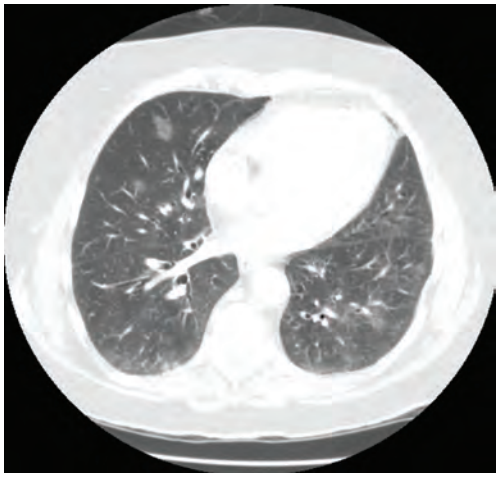
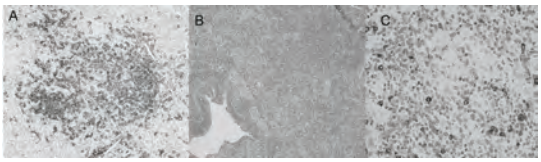


Figure 2. Wedge Biopsy of Lung



(A) A dense interstitial lymphoplasmacytic infiltrate occupies the pulmonary parenchyma and involves a bronchiole (hematoxylin and eosin, low magnification). (B) An immunostain for CD20 highlights nodules of B lymphoid cells (intermediate magnification). (C) RNA chromogenic in-situ hybridization (CISH) for kappa (red chromogen) and lambda (brown chromogen) light chains reveals a clear predominance of kappa light chain over lambda light chain-associated RNA among the plasmacytic cells, providing supportive evidence of kappa light chain restriction (intermediate magnification).

graph done for an unrelated cause. Cough, dyspnea, and chest pain are the most common symptoms, with less than a quarter of patients having B symptoms (fever, night sweats, sweating).[5] Approximately two-thirds of patients are smokers. Crackles on chest auscultation are present in about one-third of patients.[5] The various patterns of pulmonary involvement are nodules, single or multiple localized areas of consolidation usually with an accompanying air bronchogram, peribronchial infiltrates, and reticulation, with one-third of patients presenting with bilateral ground glass opacities.[8]

Diagnosis is definitively made through histopathologic examination. Tissue from the lungs can be obtained by transbronchial biopsy, CT-guided biopsy, video-assisted or open thoracotomy. When histopathological examination with immunohistochemistry and CISH is not sufficient for diagnosis, immunoglobin heavy-chain gene rearrangement molecular studies are helpful in confirming the diagnosis of BALT lymphoma.[5] If the patient has involvement of mediastinal or hilar lymph nodes, biopsy can be done through mediastinoscopy, which can help with tissue diagnosis. Involvement of mediastinal/hilar lymph nodes are associated with poor overall prognosis.[9]

The treatment of BALT lymphoma includes the use of different chemotherapeutic agents for diffuse disease and surgery or radiation therapy for localized disease.[5] One-third of patients with non-gastrointestinal MALT lymphomas are found to have gastric involvement, and gastrointestinal surveillance is warranted in these patients.[10] BALT lymphomas usually have an indolent course, and the outcome has been generally favorable in most series, with a 5-year survival rate of >80% and a median survival time of >10 years.[11]

Surgery, chemotherapy, and radiation therapy, alone or in combination, are the options for the treatment of BALT lymphoma. The optimal management and use of these modalities have not been determined. The choice of therapy depends on the stage of the disease. Localized disease can be treated with surgery and radiation therapy, whereas disseminated disease requires chemotherapy. Oh et al[9] conducted a retrospective analysis of 61 biopsy-proven BALT lymphoma patients over a 17-year period (1991 – 2008) who were treated with different modalities. Those with localized disease were treated with surgery, radiation therapy, or chemotherapy, with some patients receiving adjuvant chemotherapy after surgery. Patients with disseminated disease were treated with chemotherapy. The overall survival and time to progression were noted. The chemotherapeutic agents used were R-CVP (rituximab, cyclophosphamide, vincristine, prednisolone), R-CHOP (cyclophosphamide, doxorubicin, vincristine, prednisolone), or FND (fludarabine, mitoxantrone, dexamethasone). A total of 56 out of 61 patients were treated; 22 patients had surgery with or without chemotherapy and radiation therapy; 28 patients had chemotherapy alone; and 6 patients had radiotherapy. The total time of progression and overall survival did not differ between these groups. They concluded that no treatment was superior to another, and that chemotherapy should be considered as a first-line option to preserve lung function.

CONCLUSION

BALT lymphoma is a rare disease with a nonspecific presentation and diverse radiological appearance on chest radiography. It should be considered in the differential diagnosis in a patient with bilateral pulmonary nodules and ground glass opacity, particularly with underlying Sjogren's syndrome.

Funding/Support: None declared.

Financial Disclosures: None declared.

REFERENCES:

1. Harris NL, Jaffe ES, Diebold J, et al. World Health Organization classification of neoplastic diseases of the hematopoietic and lymphoid tissues: report of the Clinical Advisory Committee Meeting—Airlie House, Virginia, November 1997. *J Clin Oncol.* 1999;17:3835-3849.

2. Harris NL, Jaffe ES, Stein H, et al. A revised European-American classification of lymphoid neoplasms: a proposal from the International Lymphoma Study Group. *Blood.* 1994;84:1361-1392.

3. Cavalli F, Isaacson PG, Gascoyne RD, Zucca E. MALT Lymphomas. *Hematology Am Soc Hematol Educ Program.* 2001;241-258.

4. Armitage J, Weisenburger D. New approach to classifying non-Hodgkin's lymphomas: clinical features of the major histologic subtypes. Non-Hodgkin's Lymphoma Classification Project. *J Clin Oncol.* 1998;16:2780-2795.

5. Ahmed S, Kussick SJ, Siddiqui AK, et al. Bronchial-associated lymphoid tissue lymphoma: a clinical study of a rare disease. *Eur J Cancer.* 2004;40:1320-1326.

6. Isaacson PG. Mucosa-associated lymphoid tissue lymphoma. *Semin Hematol.* 1999;36:139-147.

7. Nicholson AG, Wotherspoon AC, Jones AL, Sheppard MN, Isaacson PG, Corrin B. Pulmonary B-cell non-Hodgkin's lymphoma associated with autoimmune disorders: a clinicopathological review of six cases. *Eur Respir J.* 1996;9:2022-2025.

8. Wislez M, Cadranel J, Antoine M, et al. Lymphoma of pulmonary mucosa-associated lymphoid tissue: CT scan findings and pathological correlations. *Eur Respir J.* 1999;14:423-429.

9. Oh SY, Kim WS, Kim JS, et al. Pulmonary marginal zone B-cell lymphoma of MALT type—what is a prognostic factor and which is the optimal treatment, operation, or chemotherapy?: Consortium for Improving Survival of Lymphoma (CISL) study. *Ann Hematol.* 2010;89:563-568.

10. Dabaja BS, Ha CS, Wilder RB, et al. Importance of esophagogastroduodenoscopy in the evaluation of non-gastrointestinal mucosa-associated lymphoid tissue lymphoma. *Cancer J.* 2003;9:321-324.

11. L'Hoste RJ Jr, Filippa DA, Lieberman PH, Bretsky S. Primary pulmonary lymphomas. A clinicopathologic analysis of 36 cases. *Cancer.* 1984;54:1397-1406.

Innovation in Organ Transplantation Makes Best Use of Short Supply

Joseph E. Kerschner, MD

Just as we celebrate the 79 people per day on average who receive a solid organ transplant in the United States, we as physicians must be motivated to find new solutions for the 18 who die each day due to the shortage of donated organs.[1]

In 2012, more than 28,000 organ transplants were performed nationally, with 646 taking place in Wisconsin. This means more transplants per capita are performed in Wisconsin than the national per capita average. However, there are more than 2200 people in our state on the waiting list for an organ transplant,[2] and the statistics tell us that not all will receive one.

With the need for organs outpacing supply, it is incumbent upon us to be the best possible stewards for these precious resources. Through innovation in surgical techniques, treatment protocols and research, the Medical College of Wisconsin (MCW), with its clinical partners, is developing new means to optimize the use of donor organs.

Our efforts are built on a strong clinical platform comprising a solid organ transplantation joint program among MCW, Froedtert Health, Children's Hospital of Wisconsin, and BloodCenter of Wisconsin. Led by Johnny C. Hong, MD, the program is skilled in every type of solid organ transplantation. To help meet the needs of those requiring solid organ transplantation in Wisconsin, the partner organizations have made recent investments in growth and sustainability. This, in turn, has led to programmatic enhancements and new opportunities, such as our lung transplantation program receiving certification from the Centers for Medicare & Medicaid Services.

With the need for organs outpacing supply, it is incumbent upon us to be the best possible stewards for these precious resources.

Our MCW-Froedtert-Children's Hospital of Wisconsin transplant center leads eastern Wisconsin in providing expanded access to kidneys donated from live donors through the National Kidney Registry. Last summer, our transplant center participated in the world's second largest kidney chain, which involved 28 donors, 28 recipients, and 19 transplant centers. We transplanted a 55-year-old Racine man with a kidney from an altruistic donor after the man's son-in-law donated a kidney on his behalf to another recipient in the chain. With organs in short supply, kidney chains help increase the chances of finding a donor match.

Saving multiple lives with 1 organ demonstrates using available resources to their fullest potential, an ability that MCW's surgical expertise and collaborative, integrated teams allow. Last year, Dr Hong and his team performed the first in situ split liver transplant in Wisconsin, in which the liver from a single deceased adult donor was divided into 2 functional grafts. One portion was received by a critically ill infant at Children's Hospital and the other by an adult patient at Froedtert. The liver's remarkable ability to regenerate makes such a procedure possible. In December, the team successfully completed a live donor liver transplant, an option available in only a handful of programs in the country.

For those requiring lung transplantation, the availability of organs is particularly problematic. The physiological changes that occur in the deceased donor upon brain death cause detrimental changes in the lungs, limiting the ability to use them for transplant. Fluid and protein deposition and alveolar damage often cre-

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Dr Kerschner is dean of the medical school and executive vice president of the Medical College of Wisconsin.

ate a dysfunctional organ with only about 20% of available lungs being suitable for transplant. However, when Robert B. Love, MD, joined MCW in 2012 he brought with him a research program and technology capable of reversing the damage. He is the data monitor for the Food and Drug Administration (FDA) in a clinical trial investigating the efficacy and safety of ex vivo lung perfusion.

In this tailored rehabilitation process, the lungs are removed from the donor and put on a physiological circuit, ventilated and continuously perfused by a solution providing nutrition, antibiotic, antiviral, and anti-inflammatory medications to enhance the organ viability. Simultaneously, excess fluid is removed and together, these processes rehabilitate lungs to a point that they are healthy enough for transplant.

This ex vivo technology currently is approved for clinical use in Canada and several countries in Europe, and FDA approval for the United States is anticipated this year. Preliminary results suggest that incorporation of this technology could double the lung supply and substantially shorten the waiting list. Organ rehabilitation may someday include gene therapy and has potential applications for other organs as well.

Technological advances also are helping bridge patients to transplant. Mechanical circulatory support has led to extended life for adult and pediatric patients at MCW, Froedtert Hospital, and Children's Hospital as they await heart transplants. Recently, a team led by Ronald Woods, MD, PhD, reported the first long-term successful bridge of a single ventricle patient with the Heartware® ventricular assist device.

Perhaps even more remarkable, the patient was 100% sensitized to human leukocyte antigens (HLA), which can increase wait times and hinder good outcomes for heart transplant patients. The virtual crossmatch, a strategy developed at MCW in collaboration with the Children's Hospital Herma Heart Center transplant program and the BloodCenter, can be used to predict histocompatibility and has become standard practice for sensitized organ transplant candidates. Using this tool, the patient was transplanted with a compatible organ and a negative crossmatch. This further demonstrates a commitment to making optimal use of the precious few organs available.

Reducing the number of transplants that fail due to organ rejection remains a critical area of needed advancement to maximize our limited organ supply. Michael E. Mitchell, MD, and Mats Hidestrand, PhD, are co-principal investigators for a new National Institutes of Health grant to develop a noninvasive method for monitoring rejection in children and adults with heart transplants. Biopsy, which carries high costs and inherent risks, is the current monitoring standard. This research instead uses targeted sequencing to precisely quantify the amount of donor specific cell free DNA in recipient plasma. Donor cell free DNA increases in patients undergoing solid organ rejection, and this technology provides the promise for more sensitive and early detection of rejection so that medical therapy to reverse these processes can be more precisely administered.

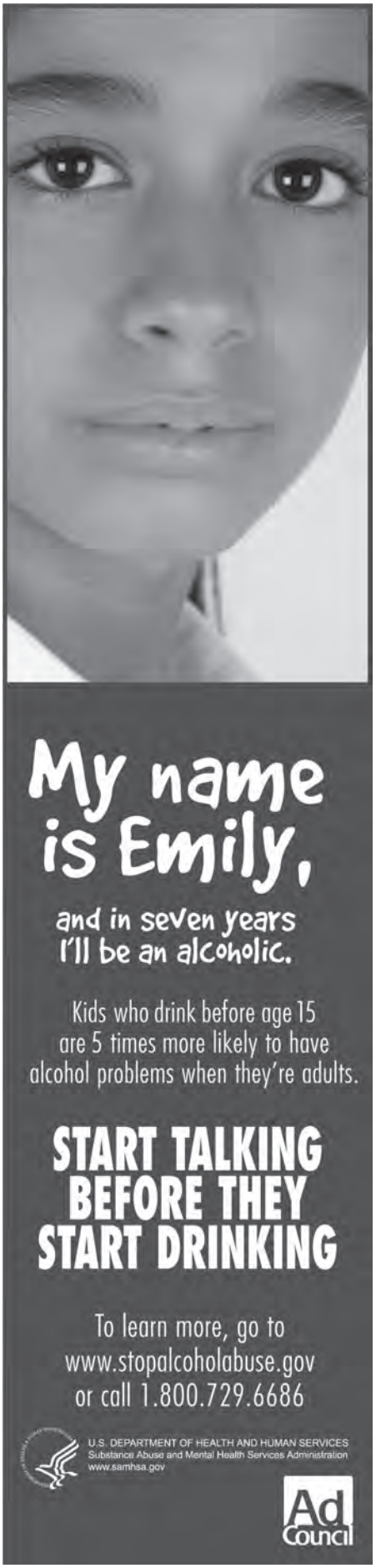
The MCW team has assembled a consortium of major adult and pediatric heart transplant centers to participate in a prospective blinded longitudinal study to test this rapid, highly sensitive and cost-effective approach for monitoring rejection. It is worth noting that this technology may similarly benefit other (noncardiac) organ transplant recipients.

In addition to practice and research innovation, we also provide education to our community about life-saving organ transplantation and donation. In October, Froedtert and the Medical College of Wisconsin earned gold level recognition from the US Department of Health and Human Services for outreach for organ donation and registration efforts. As physicians, we continuously strive to develop innovative strategies to improve outcomes for transplant recipients. It is our obligation to ensure the gift of life reaches its intended destination.

References

1. The need is real: data. Health Resources and Services Administration. US government information on organ and tissue donation and transplantation. http://organdonor.gov/about/data.html. Accessed January 31, 2014.

2. Health Resources and Services Administration. Organ Procurement and Transplantation Network web site. http://optn.transplant.hrsa.gov/data/. Accessed January 31, 2014.



Sustaining Improvements in Quality

Jessica King; Jay A. Gold, MD, JD, MPH

Quality improvement is a continuous process. While organizations often add new topics, projects, and priorities to their strategic plans, it remains critical to sustain improvements already made. An organization can take solid steps to ensure its quality gains hold.[1]

One of the keys to sustaining changes is to make it as easy as possible for people to use the new practices and as difficult as possible to return to "business as usual." The changes a team made during an improvement project must be embedded into the routines of all staff involved. Quality is not one person's job.

Here in Wisconsin, many hospitals participating in MetaStar's learning and action network, which has focused on the reduction of health care-associated infections, have made great strides in lowering their rates of catheter-associated urinary tract infections (CAUTIs) and utilization of catheters. They did so through redesign of processes and increased data monitoring.

Although we are pleased by this improvement, the work is not over. We have encouraged participants to assess the sustainability of their current prevention efforts through a scored worksheet. For example, we ask hospitals to consider the degree to which they have incorporated practices such as alerts for removal of unnecessary catheters, regular meetings to learn from defects, or the provision of standardized aseptic insertion supplies. Ascertaining areas where teams could do more to integrate best practices for CAUTI reduction into the clinical culture and staff workflows allows for further refinement of improvement efforts.

No single element can ensure successful sustainment. Rather, a confluence of factors affects whether an improvement is continued successfully.[2] These factors may involve processes, staff, or organizational support and culture. Listed below are some of the main indicators of sustainability.

Regarding process, teams can ensure the following:

- All procedures are documented and updated to reflect new methods.
- Benefits of the changes are understood and endorsed by staff.
- Changes improve – or at least do not burden – work efficiency and ease.
- Data regarding the process are easily available and are reviewed on a regular schedule with the team.
- Process can be sustained in the event of staff turnover – standard procedures can be documented; process owners and back-up owners should be clearly defined.

Regarding staff, teams can ensure:

- Staff affected by the change are involved in the change process from the beginning.
- Staff are fully trained on new procedures.
- Senior leaders are engaged and supportive.
- Physicians and other clinical leaders are engaged, investing their own time in making changes – credible physician champions promoting the changes can make a world of difference.

Regarding organization, teams can ensure:

- Changes are aligned with organizational aims and strategic priorities.
- Infrastructure, including facilities and equipment, is adequate to sustain new processes.

Unsurprisingly, a quality improvement project ultimately may fail if some of these factors are not implemented. If there is a lack of training or documentation, or if clinical leaders are not on board, initial gains are apt to slip over time. But lasting change is possible with thoughtful planning and an honest assessment of potential gaps. By taking action in a timely fashion, teams can deliver consistent and improved outcomes and increase the long-term success rate of improvement projects.

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This material was prepared by MetaStar, the Medicare Quality Improvement Organization for Wisconsin, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy. 10SOW-WI-CRSP-14-02. Ms. King is senior communications specialist and innovation spread adviser; Dr Gold is senior vice president and chief medical officer for MetaStar.

References

1. Sustaining and Spreading Quality Improvement: A Conversation With Julie Kliger, MPA, BSN, Director, Integrated Nurse Leadership Program, University of California San Francisco. Agency for Healthcare Research and Quality website. http://www.innovations.ahrq.gov/content.aspx?id=3433. Accessed January 22, 2014.

2. Doyle C, Howe C, Woodcock T, et al. Making change last: applying the NHS institute for innovation and improvement sustainability model to healthcare improvement. *Implement Sci.* 2013;8(1):127.

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Physicians are Key to ICD-10 Success

Jen Cohrs, CPC, CPMA, CGIC

From primary care physicians to hospitalists and specialists, all physicians in all health care settings are going to be affected by the transition to ICD-10—if they haven't already. And with the October 1, 2014 compliance date just around the corner, it's important that physicians are prepared. A lack of compliance will result in a direct hit to a practice's revenue cycle, productivity, and quality data.

ICD-10 is arguably one of the biggest changes to health care in decades. With significant administrative and financial implications, its implementation is a massive undertaking for practices. Proponents believe ICD-10 will improve the ability to measure health care services provided to patients, enhance clinical decision-making, track public health issues, conduct medical research, identify fraud and abuse, and design payment systems to ensure services are reimbursed appropriately. But it is not without controversy.

Physicians, hospital administrators, organized medicine, and others have voiced many concerns, particularly that the increase in the number of diagnosis codes—from 14,000 in ICD-9 to about 69,000 in ICD-10—make ICD-10 too complex and difficult to use. Implementation was delayed a year to allow more time to prepare, but the Centers for Medicare and Medicaid Services has made it clear the deadline will not be extended a second time.

Although the ICD-10-CM diagnosis code set is substantially larger than its predecessor, ICD-10 is not that radically different. ICD-10 codes are, however, more precise. As such, they promise to provide more accurate information about the patient, which in turn will justify medical necessity for utilization of goods, services, and complex procedures and should decrease the need to include supporting documentation with claims.

Currently, insufficient documentation results in inaccurate reimbursement, higher probability for audit recoveries, and poorly demonstrated quality of care. Less specificity in ICD-9 codes often results in physicians not receiving appropriate credit for treating more complex cases. The medical record needs to link symptoms, complications, and manifestations to disease process, ultimately demonstrating medical necessity and clinical appropriateness for ordering and rendering services. The physician who picks up the patient record should have a clear, concise picture that identifies exactly what was done for the patient, including outcomes, orders, and other information needed to provide continuing care. The more specific documentation required with ICD-10 will drive more appropriate reimbursement across the spectrum.

There are a number of resources available to help practices prepare for ICD-10. *(See box.)* And because detailed physician documentation is the foundation of ICD-10, the Wisconsin Medical Society has prepared a webinar series specifically for physicians. *ICD-10: What Physicians Need to Know,* is a 30-minute introductory program available online, on-demand that addresses the fundamentals of ICD-10. There are also sessions available for 20 different specialties that delve into the details necessary for specified diagnosis code assignment relevant to each of those specialties. Information is available on the Society's website at www.wisconsinmedicalsociety.org/resources/icd-10.

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ICD-10 Resources

Wisconsin Medical Society
(https://www.wisconsinmedicalsociety.org/resources/icd-10/)

American Medical Association
(http://www.ama-assn.org/ama/pub/physician-resources/solutions-managing-your-practice/coding-billing-insurance/hipaahealth-insurance-portability-accountability-act/transaction-code-set-standards/icd10-code-set.page?)

Centers for Medicare & Medicaid Services
(https://www.cms.gov/Medicare/Coding/ICD10/index.html?redirect=/ICD10/)

American Health Information Management Association
(http://www.ahima.org/icd10/)

Wisconsin ICD-10 Task Force
(http://www.wicd10.org/)

American Academy of Professional Coders
(http://www.aapc.com/ICD-10/

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ICD-10-CM for Physicians

The Wisconsin Medical Society has the information physicians need for a successful transition to ICD-10-CM. Learn the fundamentals during ICD-10: What Physicians Need to Know, and then dive into the documentation details relevant to your specialty.

Physicians can receive continuing medical education (CME) credit for the online activities but must register individually to do so. The concise, 30-minute activities are packed with the crucial details of ICD-10-CM as it relates to these specialties:

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Cardiology
Dermatology
Emergency Medicine
Endocrinology
Family Practice
Gastroenterology
General Surgery
Internal Medicine
Neurology & Neurosurgery
Obstetrics/Gynecology
Oncology
Ophthalmology
Orthopedics, Injuries
Orthopedics, Musculoskeletal Disease
Otolaryngology
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Psychiatry & Mental Health
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More information, including registration, CME details, course descriptions and pricing for members and non-members, is available at http://wismed.inreachce.com.

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